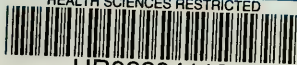


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ELEVENTH ANNUAL REPORT
OF THE
PROVINCIAL BOARD OF HEALTH
OF ONTARIO
FOR THE YEAR 1892.

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ELEVENTH ANNUAL REPORT

OF THE

PROVINCIAL BOARD OF HEALTH

OF ONTARIO

BEING FOR THE YEAR

1892.

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.



TORONTO

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TENTH ANNUAL REPORT

OF THE

PROVINCIAL BOARD OF HEALTH

To the Honorable GEORGE AIREY KIRKPATRICK, Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOR :

It has been a source of great pleasure to everyone that Asiatic cholera, which was introduced by European immigrants into New York City in the month of August, 1892, was so efficiently controlled by the local sanitary authorities that no fresh centres of infection occurred, and that the disease was prevented from spreading on this continent. Since last summer, however, the people generally of this Province, and boards of health particularly, have been much occupied with the consideration of its possible advent among us during the hot weather of 1893.

In order to ascertain the best methods of preventing the entrance of this terrible plague into our country, and among other things, to establish the relations between Dominion and Provincial sanitation, a Conference consisting of representatives from the provincial governments, was officially called by the Minister of Agriculture, and met on January 31st, 1893, at Ottawa. A full report of the proceedings of the Conference will be found in Part II of this Report.

The Provincial Board of Health of Ontario has also, as Your Honor is aware, adopted special Regulations designed to prevent the entrance of cholera into Ontario, and more especially to stamp it out should it appear in any of our municipalities. The full text of these Regulations, dated the 11th day of April, 1893, has already been published and distributed to Local Boards of Health.

A circular has also been issued by this Board, giving advice to the public, for the restriction and prevention of cholera.

A still more important work has been the preparation of Pamphlet No. 1, 1893, or "Rules for checking the spread of contagious or infectious diseases, and hints on methods for dealing with municipal and house wastes." This pamphlet is probably the most important which has so far been issued by this Board. It deals with the salient features of private and municipal hygiene, and is intended to be a *vade mecum* to sanitary inspectors, and a work of ready reference for municipal boards of health. While some of the rules and regulations, which it contains, refer specially to the prevention of cholera, many also apply to such diseases as diphtheria, typhoid fever, scarlet-fever and measles, some of which unfortunately prevail in different parts of the Province every year.

A perusal of the reports of medical health officers of cities in Ontario shows, that in all the cities the sanitary condition of the inhabitants is good, and that in some distinct

advances have been made in preventing sickness and lowering the death rate. This fact is very distinctly brought out in the report of Dr. Griffin, Medical Health Officer, of Brantford. In this gentleman's opinion it is established beyond any doubt, that the most potent factor in the causation of typhoid fever, is impure water, and that attacks of typhoid fever in Brantford were brought on by the use of impure well water. Dr. Griffin also reports, that of the fifty-five cases of typhoid fever, which occurred in Brantford during 1892, since the introduction of a pure public water supply, only seven could be ascribed to emanations from foul unventilated drains or soak-pits, the other forty-eight being traceable to the use of impure, unboiled well water.

In St. Thomas, also, where, as Dr. VanBuskirk, the Medical Health Officer observes, typhoid fever used to be of common occurrence, it has now almost disappeared. This happy condition of affairs has been brought about by the disuse of private wells and the introduction into St. Thomas of filtered water, which in addition to supplying domestic wants, is also employed in flushing the eight miles of brick and tile sewers which that city possesses.

In the reports from the cities of Ontario we also read of demands for the abolition of privy pits, the removal or renovation of old sewers and the introduction of new ones. Improved systems of scavenging and disposal of garbage and excreta, the systematic application of steam as a disinfecting agent, and the more general use of isolation hospitals are also receiving attention from municipal health authorities.

The ready reception accorded to improved methods of heating and ventilating houses by the people of this Province, their efforts to obtain the best sanitary conveniences in their houses, and the co-operative energy displayed by them in assisting the health authorities to put down infectious diseases, are all evidence of the fact that the efforts of this Board and of the Local Boards of Health to restrict disease and decrease some of the worse discomforts of life, are receiving a hearty appreciation from an intelligent and reflective people. There can be no doubt, also, that owing to the general diffusion of education among the people and the teaching of hygiene in the public schools, the abolition of the cruder sanitary methods and the introduction of modern sanitary conveniences will be more generally demanded.

In addition to ordinary work, this Board has sent a sanitary exhibit to the World's Fair at Chicago. To visiting sanitarians from all portions of the world, it will serve as an indication of productive vigor in health work in this country, while to the general public it will show that the premier province of the Dominion wisely watches over the health as well as the wealth and commercial prosperity of her children.

There are at present 592 Local Boards of Health, and of these 365 have appointed Medical Health Officers.

Trusting that the already favorable health conditions of the Province may continue to improve, and that the now thoroughly aroused vigilance of Local Boards of Health may not be too easily lulled into a condition of false security,

I have the honor to remain,

Your obedient servant,

JNO. J. CASSIDY,

Chairman.

PART I.

REPORT OF THE SECRETARY.

CHAPTER I.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—In referring to the chief features which have marked the Board's work during the year, I find that they are especially characterized by the details of executive work which seem to be increasing from year to year, and in some ways taking precedence of the work of disseminating sanitary information which formed so large a part of the work in the earlier years of the Board's organization. It cannot be said, however, that the latter work was neglected during the year, as the Board published, in addition to the dissemination of many copies of the Public Health Act and of the pamphlet on "How to Check Contagious Diseases," a large edition of the "Advice to the Public on Cholera" and "The Annual Report of the Association of Executive Health Officers of Ontario."

The addition of the Laboratory to the equipment of the Board has been a great aid to its executive work, as by it the examination of public water and ice supplies, of the investigation of specimens of diseased tissues of animals, and the bacteriological investigations of suspected contagious diseases of men and animals have enabled the Board to draw accurate conclusions and give authoritative opinions with regard to the many matters brought before it for consideration by Local Boards of Health, which have been of the greatest value in advancing the work laid upon the Board by the Public Health Act and the various amendments thereto.

The appointment by the Government of your Secretary to the position of Deputy-Registrar-General has by bringing the Registration of Births, Marriages and Deaths into close relation with the work of the Board likewise further consolidated, extended and broadened the work of Public Health in Ontario.

The study of the Vital Statistics of the Province as they yearly become more accurate and scientific becomes of much importance to the work of the Board, as thereby attention is drawn to the prevalence of certain classes of disease, and as a result enquiry into the causes which lie behind such prevalence most naturally follows.

While it cannot be said that either the work of the Provincial Board or of the Local Boards of the Province has attained that degree of efficiency which is the dream of every enthusiastic sanitarian, yet when a comparison is instituted between the sanitary status of Ontario and that of any other Province or State on the continent, the Board may well be gratified in feeling that the work of ten years has not been in vain. This cannot be better illustrated than by a reference to the diagrams setting forth the relative prevalence of contagious disease in the Province during the past ten years, and to various tables in the Report of the Registrar General, which indicate the decreasing death-rate per 1,000 in different cities of the Province. The extension of the work of the Board and the widening interest and influence of public health is further noticeable in the close relationships being yearly established between not only the Provincial Board and Local Boards, but between them and sanitary engineers, public school inspectors, veterinary surgeons and those engaged in the various branches of scientific agriculture. Waterworks and sewerage schemes, the investigation of outbreaks of disease in animals, diseases among insects as

the "flour moth" pest and foul brood in bees, parasitic diseases in sheep and horses, the ventilation and construction of schools and factories, and many other problems have increasingly engaged the Board's attention; and viewing at the close of a year's work the Board's operations, one is inclined to be enthusiastic and sanguine that the Laureate's words will prove true:

"O yet one trusts that somehow good
Will be the final goal of ill."

CHAPTER II.

THE ECONOMIC VALUE OF SANITATION.

From time to time this subject in some one or other of its aspects has been discussed in the pages of the Annual Report of this Board; but the necessity for constantly keeping it before ourselves and the public, and the influence which it has in elevating the work of health legislation whether national, provincial or municipal, is a sufficient excuse for again setting forth some of its phases in this Report. Not since the year 1885, when small-pox swept over Montreal and many other municipalities in our sister Province, has any year illustrated this subject so much as the year 1892.

The rumors of cholera in India and Persia had reached us by June, but only in a semi-conscious way did we realize that the epidemic there had any interest for us.

But modern railway progress and the constantly increasing communication both in amount and speed had not been fully appreciated, and the summer had almost passed with its attendant dangers ere we realized the possibility of this Asiatic plague affecting the interests of this continent. And yet within three weeks from its appearance in Hamburg it was at our doors. A single day only in New York, during the fortnight succeeding September 1st, was enough to make the most cynical understand the economic value of sanitation. Business for the moment was paralysed, and even in Ontario everyone talked of and feared cholera.

Almost everyone will admit that the degree of *soundness* or *wellness* of an individual or of a community must have an economic value capable of being accurately measured or weighed in proportion as we know the exact length of the measuring yard or that the balances are sufficiently accurately adjusted; and yet we are constantly forgetting the fact. For the successful study of this problem we, however, need to constantly make use of the two factors of observation of the causes and of registration of the results of disease.

All must agree that the individual life has a certain value to the State simply from its power to produce wealth.

The first estimations regarding the value of life were intended to enable the Government of England to fix the annual amount which ought to be paid as an annuity on a certain amount paid over to it; and that insurance companies might equitably estimate the amount of premium to be paid on a policy issued for a given amount. The result of extended inquiry into the lives of Government annuitants was that, during the century preceding 1830, the length of life had notably increased, and notably in the years succeeding the Napoleonic wars.

Baron Delessert showed that in France in the

14th century,	1	person	died	in	every	17
17th	"	1	"	"	"	25
15th	"	1	"	"	"	30
1820—25	1	"	"	"	"	37

The importance of this fact became at once manifest. It was seen that if a life was prolonged by 25 per cent. the Government would then by that much be paying too much for an annuity. On the other hand insurance companies were becoming enormously rich

by charging on the supposition of the duration of life being, say 25 per cent. shorter than it actually was.

We thus can see that a life must be considered as having an actual cash value to the State whether viewed from its power to produce wealth, or by the capital which, made by the annuitant, is actually loaned to the State, for investment in some presumably profitable manner.

Manifestly, therefore, the saving of the lives of the population of a State is one of the most positive methods for the production of wealth—much better by far than the introduction of new populations by immigration, who, apart from their possibly lower physical, moral and mental status and foreign tongue, must be for some years at the best, of small value, not being trained to the special customs and class of work in a new country.

The following are a few illustrations of how wealth in this sense has increased in England:—

In 1650	England	had a population of	5,500,000
" 1801	"	"	8,892,586
" 1878	"	"	25,000,000

And during this latter period she has also contributed many millions to the population of the United States. We have already seen that the duration of life was increasing, the Registrar General's returns showing that—

In 1889—a cholera year,	the death rate was	25.1	per 1,000
" 1886—typhus fever	"	23.0	"

From 1876 onward there has been an almost uninterrupted fall. Thus in

1871—80,	the mean death rate was	21.27	per 1000
1889—it was only		17.8	"

Says Dr. Farr of the period between 1871-80, the reduced rate meant an annual saving of 20,000 lives; or comparing the period of 1833 to 1854 with that of 1871-80, the rate in the latter added nearly two years to the life of every boy, as compared with that in the former or 39.91 years increased to 41.35, or to put it in another way, taking the annual births between 1871-80 at 858,878, the difference between the two rates shows a gain for the whole children at the latter rate as compared with the former of 1,800,047 years.

What this saving of life means is that every year of the latter period, saved to England 20,000 people or 200,000 in all, having a length of life of 40 years—thereby giving to the State all the wealth, which each may produce during 40 years.

It must, from what has been said, appear evident to every one that whatever has improved the conditions whereby life is prolonged, served the economic purpose of increasing the population of a country. But some might object that it does not follow that wealth has increased simply because population has—remembering that \$50.00 of pure silver dollars would equal \$100.00 silver dollars if 50 per cent. were base alloy.

I shall endeavor, however, to show further that the quality of the value of life is actually proportionately increased by sanitation.

This is seen in several ways, thus—

(a) Assuming as is the case that about one in every fifteen of the English population is an artisan, and that he has two years added to his life, then as skill increases with experience we may say the producing value of 2,000,000 and more of English artisans for two years is added to the wealth of the country.

(b) By the relatively higher continued healthfulness of the man, who is to live two years longer than under other conditions. This is a fact beyond dispute. It has not infrequently been stated in a superficial way that by reducing the mortality we maintain alive a population of weaklings. But the statement is most misleading. If it be true that, if by purifying the air of a city or a single workshop, wherein are 100,000 people or 100 employees we are able to keep the infants and children from dying at the rate of one in four in the first year, or 50 per cent. of all under five years in the second, it is equally true that in the other we have enabled, say, 100 work girls to maintain a higher average

of health ; and while the weak might in an impure air have become unfitted for work, the strong would proportionately have had their average of health reduced. Or to put the matter in another way, suppose 10, 9, 8, 7, 6, 5, be taken as degrees of resistance to disease, and that all below five are doomed to die before reaching 21 years, then it is plain that any influence by which the resistance to disease is lessened, does by so much tend to depress the first five and proportionately the rest below the line which to the on-looker is called the health-line. Indeed, as has been well said, "the whole object of sanitary legislation is to so increase the resistive power, as to incase the body in that which shall be proof against an attack" ; this is on the positive side, but on the negative it may be said yet more truly "that the object is to remove those influences or conditions, which may be called the attacking forces."

Sir Spencer Wells, before the Sanitary Institute of Great Britain as president, said:— Assuming that in 50 years 2,000,000 of a population had been saved by sanitation and medical work, "their economical value was at least 300 million pounds, and that a clear gain." Formerly it was calculated that $\frac{1}{10}$ of the population was constantly sick and the products of all that labor necessarily withdrawn ; a great deal of this sickness has been altogether prevented, and the duration of that which comes in spite of sanitation is lessened.

But having set forth the economic value of sanitation so far as it saves lives to the State, I shall now illustrate its bearing upon the prosperity of some of our lakeside cities before adverting to some of the more modern of our sanitary or life-saving appliances.

To this end I have had prepared the following diagrams which show what the death-rate was in the several cities during the year 1890, for the two contagious diseases which cause the major proportion of deaths, typhoid and diphtheria. As will be seen from their relative prevalence in different cities the two diseases stand in very distinct categories as regards causation. While both are filth diseases, and hence are both capable of being propagated in town filth and sewage, yet diphtheria does not seem capable of causing extended epidemics through polluted water supplies, while on the other hand typhoid is now known to cause town epidemics principally through this medium. They also have two other distinctive differences, viz.: first, that typhoid attacks especially persons fifteen years and over, while diphtheria is comparatively infrequent amongst adolescents and adults ; and, second, that while typhoid is but slightly disseminated by direct contact with ordinary care, diphtheria is intensely infectious to the young who are peculiarly susceptible to it.

The diagrams illustrate this in a remarkable manner. Take Chicago and Detroit for instance. In Chicago the death-rate from both is high, while in Detroit typhoid is remarkably low, and diphtheria is enormously high ; the disproportion here seen to be so great, exists to some extent in the other cities, while the special condition to which I shall allude exists to a greater or less extent.

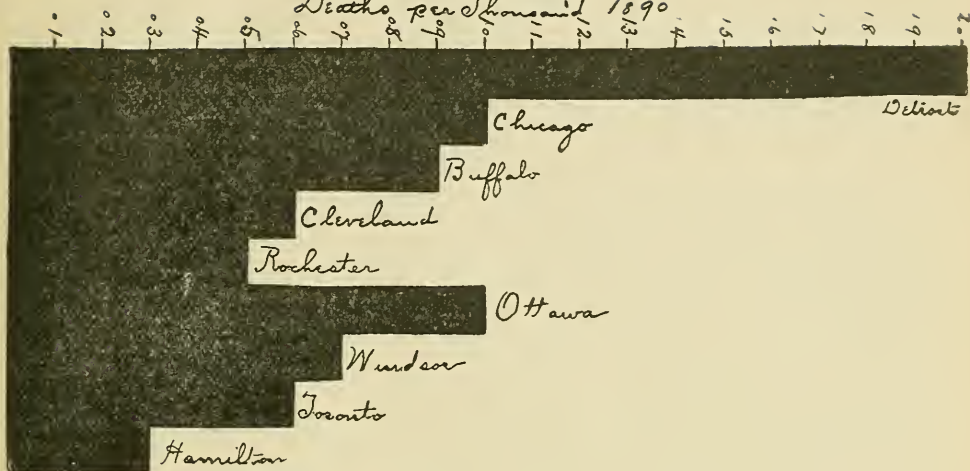
By reference to the diagram for typhoid, it will be seen that typhoid is high in Chicago, Cleveland and Toronto. All of these cities get their water supply from the great lakes as do the others, but mark the difference. In each of these the city's sewage is poured into the bay or lake in front of the city ; whereas Detroit, Buffalo and Brockville pour their sewage into the great rivers flowing past them at the rate of several miles an hour making the least contamination of their drinking water impossible. In the case of Hamilton, while the sewage is poured into the bay, it is wholly land locked, and the water is pumped from the lake outside the bar. Curiously enough, Windsor, a town of 10,000 inhabitants, has a death-rate from typhoid approaching the average, though it is opposite Detroit ; but the difference is that Walkerville sewage flows into the river a few hundred yards above the Windsor intake pipe.

I have made this digression in order to explain what the first diagram apparently teaches, and now I shall return to the economic aspect which the diagram presents. It is seen in a moment in the second diagram.

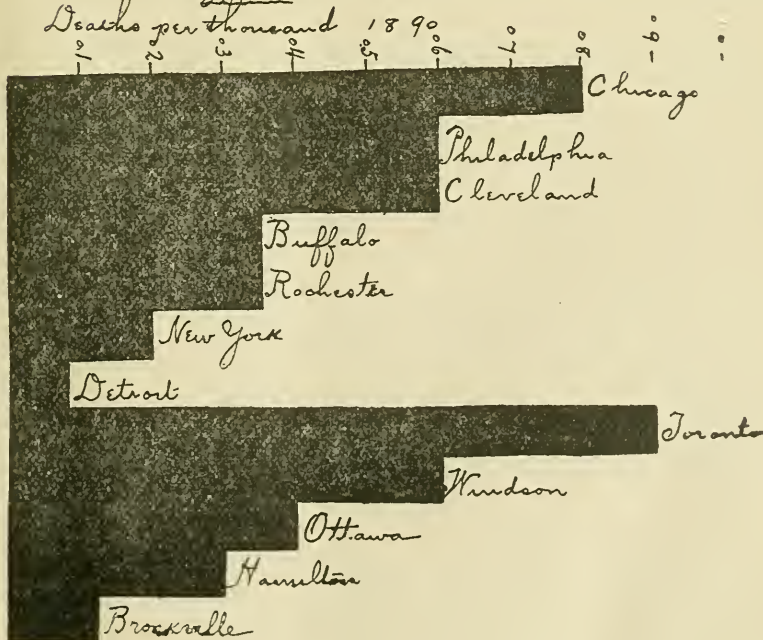
It will be seen that I have assumed that for each death from typhoid there are 19 who do not die, at any rate from this disease, although as is too often the case, it supplies conditions by which the seeds of consumption obtain an entrance to the system and produce sooner or later their fatal effects.

I have also assumed that each case of typhoid means a loss of a month to the patient,

Diphtheria
Deaths per Thousand 1890



Typhoid
Deaths per thousand 1890



and one month to the nurse ; but have said nothing about the actual expenses of the sickness in physician's bills, medicines and undertaker's fees, all of which would be proper items of loss of capital.

Taking then the figures as we find them, and with these approximately correct assumptions, we obtain the following for Chicago :

Ten cases each, $8 = 16$. per 1,000, 60 days for nurse and patient, or 960 days loss of time.

$960 \text{ days} \times 1,200 = 1,152,000 \text{ days per } 1,000$.

This divided by 300 working days = 3,840 years, or the loss of the year's work of 3,840 men.

At one dollar a day this means the loss of \$1,052,000.00 to Chicago for one year of sickness from typhoid alone. This rate would mean for Detroit a loss of \$210,400.00, whereas Detroit actually did lose only \$24,000.00. On the other hand, if the Detroit, rate were reached by Chicago, \$800,000.00 would be saved, a sum which would pay the interest at 3 per cent. on over \$26,000,000.00 of capital to invest in new water-works.

Without discussing the losses from typhoid further, I turn to the deaths from that other disease *par excellence* of this northern temperate region—diphtheria.

I have had a chart arranged to show its prevalence as well. It must undoubtedly be considered the pest of our Province. Its microbe can exist outside of the body, like that of typhoid, but has in addition an extreme capacity for spreading by infection. From tables illustrated in the diagrams I therefore draw the following conclusions, that—

(1) In a city or town with an average attention to sanitation, we have a more or less constant presence of so-called sporadic cases, amounting perhaps to 3 to 6 per 1,000. Under, however, peculiar—

(2) Seasonal atmospheric conditions (such as a prolonged dry, warm autumn) the germs of the disease seem to freely develop in organic filth. Hence an extension of the sporadic cases take place, but mark the difference with typhoid.

(3) Each case of these becomes a new centre, each house wherein a case occurs is liable to become a distributing point. Persons, and especially children going to school, spread it broadcast, unless the strictest municipal supervision is exercised over these cases and the public school.

(4) That since the direct infection is enormously more common in the sporadic cases, than in typhoid we have in this fact the evidence that the deaths from the disease are in large degree preventable, and hence form a most important factor in this question of the economics of sanitation.

Observe what the losses mean. It may be taken as a fair average that one death occurs in every five cases of diphtheria, and at least one nurse's services are constantly required for say an average of a fortnight. From these data it thus becomes easy to calculate as in the case of typhoid, what the loss means. The rate of deaths is: typhoid, 5; diphtheria, 8. But we have assumed in the case of the first, 20 cases to one death, and with the latter five cases to one death. Hence the ratio of cases is: typhoid, 20; diphtheria, 8; and if we assume that the loss in the latter is only $\frac{1}{3}$ of the former in time, we can add, what is probably below the real figure, about $\frac{1}{3}$ of the loss from diphtheria to be added to the total average loss for all the cities in the list.

Further comment seems needless. It surely is not necessary to add to all this the economic loss from doctors' bills, drug expenses and undertaker's charges, in order to show the extent to which cities lose annually from imperfect sanitary methods.

As to the measures necessary to lessen such economic losses some of these are indicated in the several succeeding chapters.

CHAPTER III.

SCHOOLS AND THEIR RELATION TO THE SPREAD OF CONTAGIOUS DISEASE.

There are in Ontario according to the Annual Report of the Department of Education for 1891, 5,828 public and separate schools, 8,336 teachers, and 527,909 pupils. Of the pupils in public schools alone 2,615 are under the age of five years, and 488,809 over that age.

The proportion of children at different ages, if we adopt the averages established by fifty years' statistics in England, would be approximately :

From 0 to 5 years of age.....	13.5 per cent. of the whole
" 5 to 9 "	11.8 " "

or almost exactly 25 per cent. of the whole population is within the first ten years of life. While in Ontario the compulsory school age begins at six years, yet a very notable proportion of children attend kindergarten at ages much younger than that. For the study of this subject it will be sufficient that a single disease, diphtheria, be taken and I propose, if possible, to show what relation its prevalence bears to the attendance of children at our public schools.

It is regrettable that the educational returns do not contain the total number of children enrolled according to their ages by years. I have been, however, favoured with statements by several of the prominent public school inspectors of the Province, which though not absolutely correct will serve fairly well as a basis for broad conclusions. From these I gather that there were,

In Hamilton..of pupils between 5 and 10, registered, (53 per cent.)	3,623
" Guelph... " " " 5 " 10, "	793
" Stratford . " " " 5 " 10, "	1,011
" St. Thomas " " " 5 " 10, "	1,421
" Windsor . " " " 5 " 10, "	1,450
	<hr/> 8,298

According to the table of populations of these several cities taken from the last census returns of 1891, the total population is 89,705.

It will be seen from this that the total school population between 5 and 10 as given in these returns amounts to 9.2 per cent. of the total population. The table from English returns shows the true percentage between 5 and 10 (10 not inclusive), to be 11.8 of the total population. Applying these rates to the school population of Ontario it appears that there is a deficiency in our school population, or in other words, that the absentees amount to 2.6 per cent., or more than 25 per cent.

From the returns for the Toronto schools, we have given the following average ages of the different grades.

Junior First Grade	6.6 years.
Senior "	8.0 "
Junior Second	9.63 "
Senior "	9.98 "

If the kindergarten classes be added to these I think it may be said that we include the total number of children between 5 and 10, which is calculated by Mr. Ballard, the Inspector for Hamilton, as amounting to about 55 per cent. of the total school population. This number as already stated, including absentees, amounts to 11.8 per cent. of the total population.

We have now to refer to the relative death rates for different periods. The English returns for 1881 give the following :

Proportion of deaths under 5 years.....	13.55 per cent.
“ “ from 5 to 10 years	12.11 “

As regards the incidence of any special disease at different age periods, we have from English statistics the following :

Total deaths from scarlatina per million.	Deaths at successive age periods.
Under 5 years..... 3,681	241
From 5 to 10 years..... 1,667	106 Per 1,000 cases in hospital.
	5,348

Or per 1,000 total deaths in hospitals :

Under 0 to 5 years	458
“ 5 to 10 “	203

We now have most of the data which will serve us in this enquiry.

From the tables from the Registrar-General's Report for 1891, I find that the total deaths in seven cities from diphtheria at the two different age periods is :

Under 0 to 5 years	155 = 44.7 per cent. of total from diphtheria.
From 5 to 10 “	110 = 31.6 “ “

or more than 75 per cent. of the total deaths from diphtheria in these cities occur in the first ten years of life.

The following table shows comparatively the deaths within the two five-year periods of scarlatina in England, and diphtheria in ten Ontario cities, and the total deaths from the two causes in each :

Year.	Scarlatina in England.	Diphtheria.
Under 0 to 5	3,681 or 68.9 %	155 or 58.5 %.
From 5 to 10.....	1,667 or 31.1 %.	110 or 41.5 %.
Total at all periods of life	5,913	347

It will further be noticed from the above that while 90.4 per cent. of the total deaths from scarlatina occur within the first decade, that 76.3 per cent. of all deaths from diphtheria occur within the same period. The peculiarly fatal tendency of scarlatina in little children is thus actually illustrated, and the same is seen in the table giving the deaths for the same two periods of those actually sick in hospitals. Indeed, the peculiarly fatal character of scarlatina attaches to the first three years of life.

Diphtheria on the other hand instead of affecting children in the first year of life, as does scarlatina,—the latter having nearly one-fifth of the total deaths in the first year—causes in the first year less than one-fifteenth of the total deaths from this cause. It is thus natural to expect that the percentage of deaths from diphtheria within the first ten years to the total deaths would be less than from scarlatina.

It is nevertheless very manifest that a very large proportion of deaths from diphtheria occur within the 5 to 10 year period, or the period of school life ; and that their occurrence and this excess may have a relation to the danger of contagion in school, greater indeed than in the case of scarlatina in England is probable for two reasons :

1st. Because that before or at the moment of invasion of scarlatina the child sickens, the eruption occurs and the child is kept from school till convalescence and close quarantine is complete.

2nd. Because that in England the severity of scarlatina has made isolation of it to be rigidly practised ; whereas in diphtheria mild cases of sore throat may go on unobserved as diphtheria for several days, and in such cases early convalescence has in many instances caused children to return to school before their throats have become free from infection. That in Ontario cities, a portion of this high percentage of deaths from diphtheria is due to school life, may perhaps receive further evidence from the fact that in Massachusetts during a series of years the proportion of deaths in the two five year periods stood as 64 to 24, instead of as in these tables 31 to 22.

Another element which enters most notably into the diffusion of epidemic diseases through schools is, as has been recently shown in an exhaustive paper on Epidemics in Schools by C. E. Shelly, M.D., of Haileybury, Eng., the fact that there is a large unprotected class termed the "explosive ratio," who have never suffered from these diseases. The total number of unprotected he shows to be nearly 60 per cent. even though entering school as late as ten years. He then states that the other condition is that of *close aggregation* of this susceptible material. While this favorable condition for the spread of any contagious disease applies especially to the class of eruptive diseases it does to some extent at least temporarily apply to diphtheria.

From the exhaustive reports of the Medical Officer of the Local Government Board of England, I have selected one or two illustrative statements of the influence which schools have on the spread of diphtheria. Thus in a report on diphtheria in Enfield in 1888, by Dr. Bruce, it is stated that within 4 weeks during which 75 individuals in 13 different families were attacked, 11 dying, 29 cases occurred out of 59 total inmates in 10 houses, and that 9 out of these 10 houses had children attending the same school.

To illustrate the fact that diphtheria has not till very recently been viewed seriously in England, this school was not closed, although parents were advised to keep children with sore throats at home. He further states that taking several hundred houses together diphtheria tended to pick out children attending the same school.

In an outbreak in the Aylesbury district during the same year Dr. Spear, who investigated the outbreak, speaks similarly regarding the excessive incidence of the disease in two particular schools. Referring to its tendency to cling to a house—which remark applies with special force to schools—Dr. Spear further notes that the houses which especially suffered from the outbreak in 1885-6, had more outbreaks in the epidemic of 1887-8 by 60 per cent. than did the other houses on infected streets. In ten instances the disease in the second outbreak occurred in houses invaded in the first epidemic.

Summing up the details of this outbreak Dr. Spear says :—

1st. From October, 1885, to March, 1886, excessive mortality from diphtheria occurred in a town previously largely free from the disease.

2nd. Its first appearance was in a row of cottages, having a first imported case.

3rd. There was a subsequent spread of the disease noted amongst the children of certain schools.

4th. From March to the next November, the outbreak almost wholly disappeared.

5th. It then re-appeared in the same first row of cottages.

6th. Along with the outbreak was an unusual prevalence of sore throat of an apparently non-specific kind.

As one of the conclusions drawn by Dr. Abbott, of the State Board of Massachusetts, from an extended study of the vital statistics of the State, relating to diphtheria and croup, from 1871 to 1888 it is stated :

"That the aggregation of people and especially of children, as in public and private schools, in workshops, in factories and in public assemblies facilitates its spread."

It is unnecessary to remark, as is readily gathered from the statistics already given, that the disease prevails to a large degree in children under school age wherever they have been exposed to the infection. It is, of course, plain that in no sense does an ordinary dwelling room differ from a school-room so far as serving either to disseminate or retain the infection if the latter be once introduced.

The purpose of these remarks is to specially direct attention to the school, as the medium by which cases of diphtheria if coming from a house where the disease from whatever cause has been introduced, become the occasion of epidemic explosions of the disease in a community.

Before referring to the special peculiarities of schools in this particular it may be well to refer for a moment to the immediate cause of the disease.

It is now eight years since Loeffler isolated a bacillus from diphtheritic membrane, and since that time bacteriologists in many laboratories have satisfied themselves that in this bacillus we have the specific cause of diphtheria. Up to the present the contagious character of the disease has been recognized by many physicians, and they with medical officers of health everywhere have treated diphtheria as a contagious disease. The special peculiarities of this microbe have been further studied, and its cultivation for diagnostic purposes have been fully illustrated in the notable experiments of Yersin and Roux of Paris.

The life history and conditions most favorable for the propagation, dissemination, preservation and destruction of this bacillus have likewise been fully set forth. Observers had long noticed the tendency of diphtheria to develop in those houses in which organic decay was notably present, either as accumulated filth in cellars, or having dark, damp and ill-ventilated spaces under buildings, where decaying wood was present. It has by experiment been further demonstrated that the germs will live a long time in unclean, dark and ill-ventilated rooms, and on cloths, clothing, etc., when not exposed to fresh air and sunlight. On the other hand it has been shown that in light, clean and well-ventilated rooms the virus of diphtheria within a few weeks becomes largely inert or destroyed. Public water supplies have never been shown to have any intimate relations to the spread of diphtheria; and, indeed, it has been shown that the germs are incapable of long sustaining life in polluted water exposed to air and sunlight. Organic deposits from sewage, however, if exposed along the shores of a bay or stream, do probably, like other accumulations of organic filth, maintain the vitality of the bacillus, and it probably is true that from privies and from night-soil exposed in fields and from street refuse deposited in dumps the germs of diphtheria have when dry been wafted by the air into neighboring houses and so caused outbreaks of the disease. The air likewise, from sewers, whether from man-holes or by defective plumbing, have, especially in the latter case, frequently been the cause of outbreaks of the disease. In all these ways diphtheria outbreaks have been produced; but the very conditions under which these outbreaks occur best illustrate how the living air of rooms, where the microbe has been disseminated either from a patient or from the clothing of persons exposed in the sick-room or other infected apartment, is daily being shown to be of all agencies the one which plays the most important rôle in spreading the disease.

Ever since the statistics of deaths have been registered with care as in England during the last fifty years, the incidence of what are called communicable diseases in the months extending from November to May has been noticed; but it has not been until bacteriology has taught that the microbes of these various diseases can grow and multiply only in warm temperatures, that the explanation of how house atmospheres, during the period of the year when ventilation is least and when children are kept indoors, have become the conditions under which infection has been most frequent. This is due not only to the fact of the increased number of germs present in house atmospheres, but also to the fact that the conditions most favorable for producing a congested mucous membrane, thereby make inoculation possible, prevail especially in cold weather.

Such are the immediate conditions favorable to the propagation and spread of diphtheria, as of other contagious diseases; but stated broadly the special condition is one of

density of population. This in the study of vital statistics has formed the subject of extended enquiry by many writers. In the study of English statistics the late Dr. Farr was able to lay down a formula by which he was able from the known number of persons per acre or per square mile in any district to calculate the general death-rate, which was found to conform very closely to the number of deaths from the mortality returns.

Thus death-rates,

Calculated gave : 18.90, 19.16, 20.87, 25.02, 28.08, 37.50, 38.74.
Registered “ 16.75, 19.16, 21.88, 24.90, 28.08, 32.49, 38.62.

These studies were of course made where sewerage and water supply and other sanitary conditions were largely the same.

The ill-effects of increased aggregation of population have further been found to be much greater in the earlier years of life. Thus from the 35th English Annual Report :

Persons to a square mile	16.6	379	4,499	65,823
Death-rate at all ages per 1000.....	16.94	21.90	28.02	38.67
Death-rate under 5 years	37.80	47.53	82.10	139.52

The figures in the last column refer to the Liverpool district.

In a remarkable paper published in 1888 by Dr. J. B. Russell, Medical Officer of Health for Glasgow, this law has been illustrated and refined in a most remarkable manner by applying it to the relation between the size of the house and the general death-rate.

He compared the twenty-four districts into which Glasgow is divided and obtained the following results :—

Size of House.	Percentage of population.	Deaths per 1,000.
One room	24.7	27.0
Two rooms	44.7	47.0
Three “	16.0	13.0
Four “	6.1	4.3
Five “	7.1	3.3
Institutions	1.4	3.2

The one and two-roomed houses were commonly what are known as “made down” houses, i.e., parts of large houses divided into many rooms rented separately. He found further the following, relative to deaths from special diseases per 1,000 of population :—

—	One and two-roomed houses.	Three and four-roomed houses.	Five rooms and upwards.
Zymotic diseases.....	4.78	2.46	1.14
Acute diseases of lungs (including consumption)	9.85	6.89	3.28

These remarkable statistics, from the standpoint of causation, are further illustrated by the experiments of Professors Carnelley and Haldane, published in the Transactions of the Royal Philosophical Society.

	One-roomed houses.			Two-roomed houses.			Houses of four rooms and upwards.		
	No. of cases.	Lowest.	Highest.	Average.	No. of cases.	Lowest.	Highest.	Average.	No. of cases.
Persons per house (per room in last class.....	29	2	10	6.6	13	4	10	6.8	18
Space per person	29	104	528	212.0	13	148	395	249.9	18
Temperature (°Fah.).....	21	43	61	55.0	9	50	59	53.5	13
Carbonic acid.....	29	6.3	32.1	11.2	12	7.1	13.2	9.9	18
Organic matter	29	7.8	38.1	15.7	11	5.0	30.2	10.1	18
Total micro-organisms....	28	6.0	240.0	60.0	13	8.0	128.0	46.0	18
Bacteria	19	6.0	120.0	58.0	11	6.0	118.0	43.0	16
Moulds	19	0.	5.0	1.2	11	0.	10.0	2.2	16

	Schools.							
	Naturally ventilated.				Mechanically ventilated.			
	No. of cases.	Lowest.	Highest.	Average.	Average.	Lowest.	Highest.	No. of cases.
Per cent. of windows open.....				22	3			
No. present, including staff	39	27	191	92	64	20	170	20
Space per person	39	56	427	168	164	119	228	20
Temperature (°Fah.)	35	44	65	55.6	62	58	69	18
Carbonic acid.....	39	7.9	37.8	18.6	12.3	7.0	19.6	20
Organic matter.....	38	5.0	600	16.2	10.1	3.4	19.0	20
Total micro-organisms.	35	8	600	152	16.58	0	58	18
Bacteria.....	28	8	40.3	151	16.0	0	56	18
Moulds	28	0	4	1.1	0.58	0	2	18
Or above outside air :								
Temperature (°Fah.)....	25	3	34	16.8	24	22	26	3
Carbonic acid	39	4.4	34.3	15.1	8.9	3.5	16.1	20
Organic matter.....	38	0	31.4	7.8	1.1	0	513	20

In this table the relative purity of the air in the better class of houses is admirably illustrated. It is of still more interest for the purposes of our subject to compare the carbonic acid and number of bacteria in the air of these rooms with their amounts in the air of public schools. To make the difference still more evident it must be remembered that schools are occupied but six hours, while the houses are constantly occupied. Still greater differences are seen in the two classes of schools, the one being naturally by fireplaces, open windows and ventilators in the ceilings, while the others were ventilated by means of fans over hot pipes. Thus, referring to the tables, it will be seen that while the number of bacteria in a litre of air in one-roomed houses averaged 60, that in naturally ventilated schools averaged 152, or two and one-half times as many, while that in the best ventilated schools was 18, or twice the number in four-roomed houses and upwards.

Further investigations were made into the source of the bacteria, and it was found that the bacteria in the air of a room were not materially increased by the presence of a large number of persons in a crowded room during a single lecture; neither did they come from the outer air introduced, it being relatively free from germs during these winter experiments. It was therefore concluded that the microbes came from the floor and other parts of the rooms. This was shown to be the case, and that their numbers largely depended on the cleanliness of the rooms.

		No. of cases.	Average space per person.	Average carbonic acid.	Average organic matter.	Average micro-organisms.
One-roomed house	Dirty	7	200	9.9	18.1	41
	Dirtier	13	221	10.7	13.5	49
	Very dirty.	6	220	11.0	15.1	93
	Clean	1	295	8.0	13.1	18
Two-roomed houses	Very clean.	2	273	12.5	10.8	10
	Clean	4	264	9.3	7.7	22
	Dirty	7	233	9.4	11.2	69
Naturally ventilated board schools.	Cleaner	12	167	19.7	18.1	91
	Ave'ge cleanliness.	12	166	14.2	16.2	125
	Dirtier	12	191	22.5	15.2	198
Mechanically ventilated schools....	Cleanest	7	194	12.5	12.7	3
	Clean	11	155	12.8	8.3	10
	Less clean	4	152	10.8	9.8	30

The schools were classified according to their length of time since construction with the following results :

	Number of cases.	Micro-organisms per litre.
Opened before 1866	7	211
“ 1875-1880	20	150
“ 1884-1885	5	38

These latter facts showed that the influences deciding the number of organisms were not those of temporary cleanliness; but that the influences at work have a gradually cumulative effect. These influences have been fully investigated by Emmerich, of Leipzig, who made a large number of analyses of the materials in the space between the floor of a room and the ceiling of the one below. To use his own words he showed “there exists nowhere in nature, not even in the neighborhood of human dwellings a soil so highly contaminated with nitrogeous organic substances and their decomposition products as the damping material under the floor of dwelling rooms.” He showed further that the carbonic acid resulting from organic decomposition in the air of empty rooms actually increased, although all other sources of carbonic acid were excluded. He further examined these materials in a prison at Amberg, in which had occurred persistently for years, epidemics of croupous pneumonia, which had attacked every seventh person and killed every twentieth prisoner. He not only found this material full of organic matter

as usual, but also discovered Friedlander's pneumococcus in enormous numbers. The effect of this filth in pneumonia was also shown by Carnelley, whose tables show that the mortality from croupous pneumonia increases from 3.5 per 1,000 in the better houses to 6.6 in the three roomed and 12.5 in the one and two-roomed houses.

The laws which both from statistics and experiment are thus shown to govern mortality rates are evidently dependent for their operation upon the fact that a house atmosphere even at its best is different from that of the external air in (1) its normal constituents, (2) its contained microbes, (3) its gases of decomposition whether arising from the waste products of animal life or of dead organic matter, (4) its relative humidity, (5) its unequal distribution of temperature, thereby producing especially draughts.

Of course it is hardly necessary to remark that the sanitary conditions in certain tenement houses, even where population is dense, may be much better, and the mortality in them even be lower than in the small, crowded houses in country places; but on the whole the broad principles already enumerated are found to hold good judged by results.

Keeping these facts fully in view we may now turn to the examination of the spread of zymotic diseases by means of our public schools in Ontario.

From time to time examinations of the public schools of some of our Canadian cities have been made notably at times when diphtheria has been prevalent in them. I am not in possession of the statistics relative to the cubic air space of our Toronto public schools; but statistics published several years ago in the Annual Report of the Board gave the following figures for Hamilton schools, viz.: average cubic air space, 127 inches.

Floor space.					
Minimum legal space.		Actual space from seat space.		Floor space from actual attendance.	
12.32	120	10.7	107	12.7	127
square feet.	cubic feet.	square feet.	cubic feet.	square feet.	cubic feet.

I was recently called in to examine the sanitary condition of the public schools of one of our cities, and found the cubic air space on the average to not exceed 200 cubic feet per pupil, and this in two-storey buildings.

What this means in the matter of density of population is seen in the following figures:

In a square acre there are..... 43,560 square feet.
 " " mile " 27,878,400 " "

In a room 10 feet high and allowing 200 cubic feet space to a pupil, the floor space for each pupil is 20 square feet.

In the most densely populated Liverpool district already referred to as having a death rate per 1,000 of 38.67, and of children under 5 years of 139.52, the population per square mile was 65,823, or that of these school rooms is 21 times as great. But it is practically double this in buildings of two storeys, for without special ventilation, the air of the two floors is common to all the children. Without, however, pursuing this calculation any further, it becomes abundantly plain that in the limited amount of air of a school-room we have present a condition wholly opposed to the process of infinite dilution which is constantly going on in the outer atmosphere, and that any deleterious materials present in the air of school-rooms has an opportunity for producing most certainly their evil effects. We have first of all in naturally ventilated and crowded schools a great increase of carbonic acid amounting even in rooms with an air space of 300 cubic feet to 15 parts in 10,000, with a proportionate increase of organic matter.

Extended most recent experiments by Merkel in Germany, and by Haldane in England, referring to the effects produced by such air cause the conclusion that they are on the one hand due directly to the poisonous effects of an excess of carbonic acid, and on the other to the absence of the normal amount of nascent oxygen necessary for oxidization of the blood.

That these poisonous effects by directly depressing the system leave it an easier prey to specific bacterial poisons may naturally be inferred; but we now are in possession of experiments on animals which give direct proof of the fact.

Roger has shown that the rabbit which is naturally immune to symptomatic anthrax quickly succumbs to the disease, if at the same time there is injected a sterilized culture of *bacillus prodigiosus*.

Chantemesse and Widal have found that a laboratory culture of the typhoid bacillus which had lost all its virulence and was entirely without effect upon guinea-pigs, proved to be extremely fatal when the vital tone of the animal was lowered by a previous injection of a culture of *proteus vulgaris*. The virulence thus acquired became exceedingly intensified by further passage through animals.

It has been shown also that physical conditions affect the power of resistance in animals. White rats which are naturally immune to anthrax, easily contracted the disease when previously exhausted by being compelled to turn a revolving wheel. Sheep which have been bled contract anthrax more quickly than healthy animals. Fowls which are naturally immune to anthrax, contract it when they have been artificially chilled.

Anæsthetics have been found to act in a similar way. *Platanus* produced anthrax in naturally immune animals (dogs, frogs and pigeons), by inoculating them when under the influence of curare, chloral or alcohol.

In the altered relative humidity of the air of rooms in winter, we have, however, what I believe to be a potent factor in the inoculation of children with the germs of diphtheria and other diseases of the respiratory mucous membrane. Everyone is familiar with the disagreeable sensations experienced in rooms heated by hot-air furnaces where no means is provided for the supply of moisture. I am not aware of any extended experiments on the subject, but the following is sufficient for purposes of illustration.

In a paper on ventilation of schools by Dr. J. J. Cassidy, presented several years ago to the Ontario Health Officers' Association, I find the following condition given of one of the best constructed, ventilated and heated schools in Toronto:

"January 26th, 1887, 3.45 p.m. Examination of the ventilation of Brock Avenue school. Upper room (girls): cubic measurement, 10,786 feet; persons usually present, 59 cubic space per head, 183 feet; temperature, 67°; hygrometer, D. B. 67°, W. B. 53½°, R. H. 41½ anemometer; size of inlet, 4 square feet; air entering per minute, 276 linear feet; air entering per hour, 16,560 linear feet; cubic feet of air entering per hour, 66,240; number of changes per hour, 6.1; door closed and four windows closed; test of air by the senses, not close."

The mere amount of relative dryness in a school-room occupied by children is, however, no index of the evil influence of the air on the mucous membrane; since the exhaled moisture produced in a room filled with little children notably increases that of the room—but only by a process of drying out of the mucous membrane similar to that by which the evaporating pan is emptied of its water. The dry air constantly inhaled passes over the mucous membrane and abstracts an amount of vapor equivalent to about $\frac{1}{10}$ of its volume, the air always being saturated when exhaled from the lungs. If 500 cubic feet of air be taken as the average amount expired by a person in 24 hours, it is apparent that 10 cubic feet of an atmosphere consisting wholly of aqueous vapor is exhaled. It can readily be understood, therefore, how in a school-room with 50 pupils, having an average air space per capita of 200 cubic feet, an enormous evaporation is constantly going on from mucous surfaces, when with this addition the air in the room, as in the examination given, has less than 50 per cent. of saturation. It is manifest that if the normal air of the room has an average humidity of 75 per cent., or is three-fourths of saturation, it will extract very much less moisture than if at only 25 per cent. of saturation.

We have, however, to look to the contamination of the air with the specific virus of disease, if we desire to explain the real and immediate cause of the spread of diphtheria and similar diseases by means of schools. I have already referred to the relative purity of external air as compared with that of house atmospheres. This may be illustrated by a comparison of the results obtained by Percy Frankland, F.C.S., in a suburb of London. Taking several day's average he found 9,800 micro-organisms per cubic metre of air which

were mostly moulds. From the experiments on the air of houses and schools already given I take the figure of the number of micro-organisms in the air of a school of average cleanliness naturally ventilated, and find it to be 125,000 per cubic metre, and in the cleanest of mechanically ventilated schools taken from 22 in all thus ventilated, there were 3,000 microbes per cubic metre.

Were there no such enormous number of microbes in school air as compared with outside air, the relative dangers would be proportionately great in the case of the school, from the fact that the same air is breathed again and again, if not by the same person, then by others, the ratio of change even with good ventilation as compared with the slightest breeze being as 1 to 2,500.

But I need not multiply by illustrations the dangers to which I have referred. Only one word need be said with regard to the conclusions to be drawn from them, which may be summed up as follows :

1. Diphtheria in houses is an intensely infectious disease.
2. It is a disease capable of a very mild character in some cases, while still retaining for several weeks in such patients the ability to transmit the infection and produce cases of extreme malignity.
3. It is a disease specially influenced as regards its infectiousness, by the character and thoroughness of local treatment, and by the frequency with which the air of a sick room is changed. How this latter is true is shown by the effects on the number of microbes in mechanically ventilated schools.
4. It is a disease peculiarly liable to attack with malignity children under ten years of age, but causes relatively fewer deaths than scarlatina amongst children under three years.
5. It is a disease, the germs of which have, when hidden away in damp, dark spaces, where dead organic matter is present, a capacity for prolonged resistance to destructive influences.
6. It is a disease whose germs are weakened in their virulence by free exposure to sunlight, moisture and free air, and these may be completely destroyed within a few days.
7. It is a disease which does not produce epidemics through the medium of public water supplies.
8. It is a disease which may be introduced into houses from defective sewers and bad plumbing; but epidemics in a series of houses on a street, or in a town or city, are never produced except by direct communication and direct infection, and this method of propagation has fresh scope and produces its most potent influences through the medium of public schools, and by persons and children visiting infected houses and by persons from infected houses visiting in healthy homes.
9. It is a disease which during the period of the last census caused 12,500 recorded deaths in Ontario, and probably more than 50,000 cases of the disease.
10. It is a disease peculiarly frequent and fatal in the latitudes lying between the Ohio River and the northern limits of settlement in Canada.
11. It has no special habitat except that it is peculiarly a house disease, and finds its greatest opportunities for spreading in damp and cold climates, where the temperature makes people close their houses to natural ventilation, and where artificial heating is specially resorted to.

CHAPTER IV.

INVESTIGATION OF DISEASE IN ANIMALS*

Tuberculosis.—The question of tuberculosis in cattle has occupied the attention of the Board considerably during the past year, and with increasing opportunities for observation it has lost none of its importance.

No one for a moment considers that it is anything but a subsidiary cause of tuberculosis in the human race, as the great danger lies in the distribution of dried sputum of persons; but still there is undoubtedly a percentage of cases due to infection through the alimentary tract, especially in young children.

No doubt whatever exists as to the danger from the use of milk from tuberculous animals, and for the purpose of investigating milk which is suspected, the laboratory of the Board has been provided with a centrifugal apparatus giving about 1,000 revolutions a minute, by means of which the bacilli which may be present in a sample of milk are made to settle to the bottom and can be drawn off with the sediment. This method increases materially the chances of discovering the bacilli in samples in which they are not numerous. By using this apparatus two cases of tuberculosis have been diagnosed.

Another phase of the subject is the danger from using the meat of diseased animals. There seems no doubt that the muscular tissue is only rarely affected with tuberculosis, and in all the experiments performed along this line it is seen that in the majority of cases the expressed juice from the muscles of diseased animals or the blood of these animals has been free from bacilli, but the fact remains that tuberculosis has occasionally been communicated to animals in this way. It is known also that the bacilli of tuberculosis may circulate in the blood for several days without losing their virulence so that in cases of extensive lesions in the animal there is undoubtedly danger from the use of such meat. In this connection it is interesting to note some recent results published in October, 1892, by Schuljansky. His conclusions are:

1. That the flesh of oxen subject to general tuberculosis when freed from all visible tubercular foci, produces loss of health in young carnivora and even death in young cats.

2. That the flesh of oxen suffering from localized tuberculosis is equally dangerous.

3. That two hours cooking of the tubercular meat does not remove its noxious properties. Young cats fed with the same and with the broth, suffered from marked follicular enteritis and parenchymatous changes of the viscera.

4. That the morbid symptoms cannot alone be attributed to the action of the bacilli, but rather to the substance produced as the result of their metabolism.

This last conclusion is in keeping with the results of Prudden's experiments upon the injection of the dead bacilli into rabbits.

Aside from the question of the actual presence of the tubercles in the muscles, there is naturally a great danger of including with the diseased meat a few tubercular glands which might possibly give rise to the disease. Another danger in the use of meat from a tuberculous animal was brought to the notice of the Board a short time ago when a small piece of cooked liver was sent to the laboratory containing a couple of small tubercles. It is possible, in fact probable, that the method of cooking liver (by frying) will raise it to a sufficient temperature to effectually destroy all living germs, but if not properly cooked there would certainly be a danger. It seems strange that a liver containing tubercles could possibly be exposed for sale, as the butcher must have known that it was diseased, and it certainly emphasizes the need of the construction of public abattoirs and the carrying out of thorough meat inspection.

Fortunately there is no necessity now of waiting for the animal to be killed before coming to a decision as to the presence or absence of tuberculosis. We have in Koch's tuberculin a diagnostic reagent which is without an equal as it enables us to diagnose with certainty cases of incipient tuberculosis as when even only one gland is affected.

* This chapter has been prepared by J. J. McKenzie, Laboratory Assistant to the Board. P. H. E.

The recognition of this agent has been delayed for several years until it could be completely tested, but there seems no doubt now that it is to be depended upon, especially in cases which are not far advanced and cannot be diagnosed by ordinary clinical methods.

There was published in a bulletin of the Board last fall a synopsis of all the cases where tuberculin had been used and the results therefrom, but up to that time the Board had not had an opportunity to test it. Since then, however, several opportunities have arisen, the results of which are given below. The tuberculin was kindly furnished by Professor Ramsay Wright, and it speaks well for its keeping qualities when it is known that the sample used was about three years old.

The first cow tested was an ordinary grade Durham which was suspected to have tuberculosis. The animal was wasting, had a slight cough, and the right lung was affected. There was also an enlarged gland in the supratharyngeal region. Microscopic examination of the milk revealed no bacilli. The temperature of the animal was running between 101° F and 102° F. 0.4 grammes of tuberculin was injected at 5.30 p.m. and the following was the temperature, reading :

4 hrs. after injection.	5 hrs.	6 hrs.	7 hrs.	8 hrs.	9 hrs.	10 hrs.	13 hrs.
102.6	103	103.2	103.8	103.8	103.6	103.4	103.6

This result was hardly satisfactory as the rise in temperature set in too early and was not sufficiently marked, but on account of the incompleteness of the temperature readings we cannot conclude that the fever had reached its height. It is marked, however, by a peculiarity which has frequently been noted, viz., the temperature rises at first to a certain point then falls slightly to again rise, usually to a still higher point.

Taking the clinical symptoms in conjunction with the results of the test as pointing strongly to tuberculosis, the animal was seized and destroyed.

The following are the results of the autopsy :

Tubercular glands in the pharyngeal region, one very large and discharging far back in the pharyngeal wall. Tubercular glands in the region of both bronchi. Left lung with scattered tubercles, right lung very badly diseased, a few scattered tubercles on the pleural lining of the right lung; diaphragm healthy; numerous tubercles in the liver; tubercular glands in the mesentery, including two large tubercular cysts; kidneys, udder, uterus and ovaries apparently healthy. A microscopic examination of the tubercles from the various regions confirmed the results of the microscopic examination.

The next tests which were made were upon eight highly bred Jerseys.

In six of these 0.3 grms. of tuberculin were injected and in two 0.4 grms. The injection was given at 8.30 a.m., Nov. 5, with the following results :

Before injection.		After injection.								
Nov. 2.	Nov. 4.	8.30	12 n.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	8 p.m.	9 p.m.	10 p.m.
1.....101	101 3.5	101 3.5	101 1.5	101 4.5	102 1.5	102 3.5	102 4.5	102 2.5	102 1.5	.....
2.....101 2.5	101 1.5	101 2.5	101 3.5	101 2.5	101 2.5	101 4.5	101 2.5	101 3.5	102	.....
3.....101 4.5	101	101 3.5	101 3.5	101 2.5	101 2.5	101 3.5	101 3.5	101 2.5	101 2.5	.....
4	101 2.5	101 2.5	101	101 1.5	101 2.5	102 1.5	101 3.5	102 3.5	103 3.5	104 3.5
5 ....101 3.5	101	101 4.5	102	102	102	102 2.5	102 1.5	103 3.5	105 1.5	105 4.5
6 .....101 3.5	101 3.5	101 3.5	101 1.5	102 1.5	102 4.5	103 2.5	103 2.5	104 1.5	105 1.5	104 4.5
7.....	101 4.5	101	101 2.5	101 3.5	101 4.5	103	104 2.5	105	105 4.5	105 3.5
8.....	101 1.5	100 1.5	101	102 2.5	103 4.5	104 3.5	104 2.5	104 3.5	104 2.5	104

Thus five of the animals gave a distinct reaction varying in intensity from 3.2° F. to 4.8° F. The reaction reached its height in No. 4 in fifteen hours, in No. 5 in fifteen

hours, in No. 6 between the thirteenth and fourteenth hours, No. 7 the same, No. 8 at the ninth hour, falling and rising again at the twelfth hour. Of these five cows, practically all would have been declared by a veterinarian as free from tuberculosis. Unfortunately it was not possible to obtain a *post mortem* on any of the animals at that time, but the use of the milk and the butter was forbidden.

In the course of a couple of months, however, No. 4 developed a slight cough, due apparently to an enlarged gland in the pharyngeal region, and taking this along with the tuberculin test, the animal was killed, and at the *post mortem* it was found on careful examination that the only lesion present was the enlarged supratharyngeal gland. This was caseating and proved to be tuberculous. The extreme delicacy of the test may be seen when it is remembered that this gland must have been quite small when the test was applied, yet its presence was sufficient to cause a rise in temperature to $104\frac{1}{2}$ degrees in fifteen hours, when only 0.3 grms. of tuberculin was injected.

The attention of the Dominion Government was called to the fact of the results of the test in this herd and the presence of tuberculosis in these animals, and it was suggested that they be destroyed and compensation granted. They, however, refused to take action, and as under the Ontario statutes no provision was made, the Government was not able to grant compensation, the owner was simply prevented from selling or using the milk or selling the animals.

The Board is much indebted to Mr. H. Cooper, V.S., through whose interest in the subject it was rendered possible to undertake the test, and to him and his assistants for help in injecting and taking the temperature.

In addition to these nine cases in which tuberculin was injected we have two others to report for which we are indebted to Mr. J. Hugo Reed, V. S., of Guelph, who injected the tuberculin sent from the laboratory of the Board and took the temperatures.

These two cases were Guernseys, one of which (No. 1) was considered to have tuberculosis from the various clinical symptoms, the other (No. 2) had had a slight cough for two weeks, but was otherwise healthy.

About 0.4 grms. tuberculin was injected into each, and the following were the results :

No. 1 temperature before injection averaged about 100 3-5, injected at 6.45 a.m.		No. 2 temperature before injection averaged about 100, injected at 7.00 a.m.	
7.45 a.m.	100 4-5	7.55 a.m.	100 2-5
9.00 "	101	9.05 "	100 3-5
10.00 "	101 1-5	10.05 "	101
11.00 "	100 4-5	11.05 "	100 4-5
12.00 "	101	12.05 "	101 3-5
1.00 p.m.	101 2-5	1.05 p.m.	102
2.00 "	101 3-5	2.05 "	102 2-5
3.00 "	102	3.05 "	103
4.00 "	102 1-5	4.05 "	104
5.00 "	103 1-5	5.05 "	105 2-5
6.00 "	103 1-5	6.05 "	105 4-5
7.00 "	103 1-5	8.05 "	106 1-5
8.00 "	103 3-5	9.05 "	107
9.00 "	104 4-5	10.00 "	105 2-5
10.00 "	102 4-5		

It will be seen that No. 2, the one which gave the slightest clinical symptoms gave the most intense reaction. This is a result which has been noticed repeatedly, and it is just on account of this peculiarity that the reagent is of value as it enables us to diagnose the disease in its incipient stages.

The results of the *post mortem* in these two cases were as follows :

In cow No. 1, mesentery and peritoneum covered with small tubercles, liver with scattered tubercles, udder badly diseased, uterus and ovaries healthy, both lungs badly diseased, pleura costalis and pulmonalis with scattered tubercles.

In cow No. 2, abdominal organs all healthy, both lungs diseased, the right one badly.

In addition to this the calf of No. 1, about a month old was killed, and the following were the results : A very unhealthy looking animal, coat staring and skin harsh, great ascites. All the abdominal organs were found to be diseased except the kidneys. The intestinal canal, mesentery and liver was one mass of tubercles. There was also slight tuberculosis of the lungs, but they were not badly diseased. The lesions in the calf would lead one to look upon it more as a case of acquired tuberculosis than congenital.*

It will be seen from these results that we have in tuberculin a re-agent of extreme delicacy, which if properly and systematically applied throughout the Province, would enable us to gradually reduce the danger from this disease amongst our cattle, provided that subsequent action on the diagnosis is taken.

In the hands of the Medical Health Officer in connection with milk inspection, it would be invaluable as it is comparatively easy to apply, and twenty cows may be tested with the same ease, and at the same time as one may be. It is certainly of a great deal more importance than a test of the quality of the milk, and could be carried on in conjunction with it. Already in some places in Europe the sanitary authorities require that the cows of public dairies should be submitted to the test twice a year.

Several other cases of tuberculosis or suspected tuberculosis have been reported to the Board during the past year, but as yet it has not been possible to take any decided action, with a view to learning the extent to which the disease exists in Canadian cattle.

Actinomycosis.—Several cases of this disease have been reported to the Board during the past year, and the usual action taken under clause 99 of the Health Act.

Fortunately in this disease a new method of treatment has been suggested, which promises to give extremely favorable results. This is by the internal administration of potassium iodide. Its use was first suggested by Bang in Denmark, and it has since been used by various veterinarians in Europe and the United States. The latest results which have come to hand are those contained in a bulletin of the Bureau of Animal Industries of Washington. Under the direction of Dr. Salmon extended experiments were carried out upon animals in various stages of the disease, with in all cases marked improvement, and in the majority complete cure.

With such a radical method of treatment, it seems as if henceforth in cases of early actinomycosis, we may be satisfied with careful isolation and thorough medication to effect a cure.

Glanders.—Several cases of glanders in horses have come to the notice of the Board, all of the animals affected being destroyed. Most of the cases were in the neighborhood of Toronto, and the local authorities have been extremely vigilant in order to prevent such a serious disease from getting a foothold in the city.

As in the case of tuberculosis we have been heretofore dependent upon clinical symptoms and bacteriological examination for a certain diagnosis. We have now, however, a diagnostic reagent which has proved itself of great value.

This is one of the metabolic products of the growth of the glanders bacillus (*B. mallei*). It is prepared by making a glycerine extract of a glanders culture, filtering it and condensing to a certain strength. When this substance, called mallein, is injected hypodermically into an animal suffering from the disease, there is produced a distinct reaction similar to the reaction produced when tuberculin is injected into a tubercular animal. This reaction is evidenced by the rise in temperature which usually takes place within twenty hours after the injection.

Mallein has been carefully tested in various localities, and results reach us from Belgium, France, England and the United States, all of which speak for its value as a means of diagnosis.

* Regarding the experiments made by Prof. Robertson on the herd of the Dominion Experimental Farm, he states : In every examination made the *post-mortem* examination confirmed the reliability of the tuberculin as a detective of the disease. The temperature in the animals which were destroyed had risen to 106.2° F., 106.2°, 106.0°, 106.0°, 105.8, 105.8, 104.8, 104.0.

We have had one opportunity of testing it in Ontario, and our results are as follows :

The mallein was sent to Mr. H. C. Cooper, V.S., from Professor Roux, of the Pasteur Institute, and it was used upon an animal which he suspected of having chronic glanders.

The following are the notes of the case diagnosed by the veterinary surgeon as a case of chronic glanders.

Nov. 12, at 11 p.m., injected 2cc. of dilute mallein :

Time.	Temperature.	Pulse.	Respiration.
November 12, 11 p.m.	100	38	Normal.
" 13, 5 a.m.	100.6	38	"
" " 7 a.m.	102.6	46	"
" " 8 a.m.	103.8	48	"
" " 9 a.m.	104.8	50	13
" " 10 a.m.	105.8	52	14
" " 11 a.m.	105.4	52	14
" " 1 p.m.	105.4	52	14
" " 4 p.m.	106.4	56	28
" " 9 p.m.	106	56	48
November 14, 6 a.m.	104.4	42	30

On post-mortem being made glanders of lungs and bronchial glands was found

The animal was condemned on this evidence, and at the *post mortem* examination the diagnosis was confirmed.

The Pasteur Institute, Paris, manufactures both tuberculin and mallein, which is sold in the concentrated form at one franc (20 cents) per cubic centimetre, one-third to one-half of a cubic centimetre being sufficient for an animal.

Hog Cholera.—Only two notifications of outbreaks of this disease have been received by the Board during the year, and in only one was an opportunity given for an examination of the tissues, in this case the results were positive. In this case the Dominion Government inspector had simply diagnosed "parasites" and refused to grant compensation. Specimens of one of the animals were sent to the Board and proved to be a typical case of hog cholera, the lesions being all characteristic and the bacillus being isolated.

Foul Brood in Bees.—Investigations have been carried on in the laboratory upon the bee disease known as foul brood, which is very common in Ontario.

Oheshire and Cheyne first showed that this disease as it is found in England was due to a specific germ, bacillus alvei. Bacteriological examinations of the Canadian disease showed that the same germ was present.

It is customary for bee-keepers to say that if brood is allowed to die and rot, that foul brood will arise, but in no case of such rotted brood was it possible to obtain bacillus alvei although it was always found in cases of the true disease.

The action of hot wax was investigated in order to discover if possible the danger arising from the use of infected wax in the manufacture of comb foundation.

Apparently where the heating was carried on a sufficiently long time, there was little danger from this source.

The action of medicated syrup on the germ was tried, as a method of treatment by such syrups is advocated by many bee-keepers.

In none of these (carbolic acid, salicylic acid, beta naphthol), was there a sufficient strength of the germicide to destroy the germs, although they prevented germination of the spores.

CHAPTER V.

HOW CONSUMPTION IS SPREAD, AND SOME MEASURES FOR ITS PREVENTION.

In view of the fact that consumption is of all causes that which produces the greatest number of deaths in temperate climates, wherever settlement has become permanent and population has become in any degree dense, it is proper that the Provincial Board of Health should again draw special attention to the paramount importance of the medical profession, officers of health and the general public realizing the nature of the conditions under which in everyday life the disease attacks the individual and gains an entrance into families and the community, and of how the people generally may do much to lessen the danger to which they are exposed.

In the account given of the discovery of the cause of consumption, now spoken of as the bacillus of tuberculosis, by Professor Koch, he states that he found them in tubercles or nodules from the lungs and brain of many persons, in inflamed scrofulous glands, in joint inflammations and the chalky nodules from the lungs of animals, as the ape, the hog, the guinea-pig, rabbit, etc. During the last ten years much further knowledge has been gained regarding the means by which the disease is disseminated, the most important being the fact of its spread by means of the milk and flesh of animals.

It will not be wondered at, therefore, that a disease, with a history so ancient as consumption is known to have, should during so many centuries have found its way into every portion of the habitable globe, wherever the conditions were such as to make its existence possible. That it has spread amongst all civilized races through favoring conditions will be shown later on; that there are few families in all Europe whose ancestors have not at some time or other suffered from it, will probably be admitted; though that there are many existing families who have no history of ancestral taint for several generations abundant evidence would seem to prove. This being admitted, and the affinities of the disease with glanders and leprosy being assumed, the comforting conclusion is forced upon us that as compulsory destruction of glandered horses has eradicated this disease from many communities, and as segregation or isolation of lepers has practically cast this opprobrious disease out from amongst Anglo-Saxon races, so consumption in some perhaps far off and ideal condition of human society, may similarly become a matter of only historical interest to the physician and statistician.

As the causes and contagiousness of consumption have become known, so its hereditary nature is being less insisted upon, and the possibility of the disease being induced is becoming proportionately prominent.

To illustrate, however, the task society has before it, the following figures are given:

During the twenty-five years ending 1886, the average total deaths from phthisis have been 50,000 yearly in England, and those from other tubercular affections 17,700, in all nearly 68,000. That however great this may be, it means a notable reduction, is gathered from the following tables:

TABLE NO. 1.

Mortality per million persons of all ages.

	1857-60.	1861-70.	1871-80.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Phthisis	2679	2475	2116	1885	1844	1870	1812	1752	1718	1591
Other tubercular diseases.....	804	781	762	705	729	707	738	651	727	65

TABLE No. 2.

Ontario, 1881, phthisis in persons over 1 year.

	No.	Per cent. of deaths of persons over 1 year.	Ratio of 1,000 of population.
In Ontario cities	464	14.6	2.04
In towns	213	17.0	2.01
Rest of Province.....	1720	13.0	1.08

Ratio of consumption to all causes.

In cities	14.67 per cent.
In towns.....	17.00 “
In country.....	13.00 “

TABLE No. 3.

General death-rate from phthisis in England in 100,000 population.

	A. Agricultural pursuits.		B. Industrial pursuits.	
	Men.	Women.	Men.	Women.
1857-1867	209	258	243	275
1868-1877	190	205	230	224
1878-1888	153	165	191	179

In the above English tables are found many interesting facts. Of these one is notable, viz., the fact, as seen in Table 3, that in agricultural communities the proportion of deaths from phthisis thirty years ago was almost equal to those engaged in industrial pursuits. While this serves to especially illustrate the insanitary conditions of the farm labouring class in those years, it points similarly to the fact that even with the many modern improvements in the sanitary condition of workshops, the over-crowding which is induced by increased manufacturing industries has failed to equal the improvements which have marked the habits of life of the English working classes. The great difference between this class in England and in Ontario is gathered from the foregoing figures.

During recent years most extended studies of statistics of tuberculosis have been made, from amongst which the notable fact has been deduced by Bayard, who found that the ratio of frequency in the occurrence of the disease in men and animals in different districts has run almost parallel.

The statistics already quoted in Table 3, showing the number of deaths amongst the women of the agricultural class in England, as compared with the men, and showing the malign influences of indoor life, the ratio being 230 women and 205 men and of the greater mortality in industrial operations, the ratio being 467 to 664, fully illustrate the point that with the decreased resistance of the system, due to industrial pursuits, is associated the increased danger due to greater exposure in an atmosphere impure and containing the bacilli of tuberculosis.

“Mager, from Bavarian statistics, estimates the proportion of deaths from phthisis between town and country at 100 to 61.” (Hirsch).

This increase of the phthisical amongst the industrial classes is due not alone to the increased dangers of infection, but to the nature of the occupation. “Dusty trades,” says Wynter Blythe, “are specially liable to produce tubercular disease.”

Dr. C. Lombard states that of 1,000 deaths of adults from consumption they could be classed as follows :

Occupations with mineral emanations	176
“ “ “ various dusts	145
Sedentary life	140
Workshop	138
Hot and dry air	127
Stooping posture	122
Sudden movement of arms	116
Muscular exercise by active life	89
Exercise of voice	75
Working in open air	73
Animal emanations	60
Occupations in which watery vapour is breathed	53

The tendency to consumption, in the town districts Dr Farr remarks, was increased to 24 per cent., and to typhus 55 per cent. ; but as the absolute mortality from consumption is three times as great as from typhus in towns, and nearly four times as great in the country, the excess of deaths from consumption caused by the insalubrity of towns is greater than the excess of deaths by typhus, a fact which has been hitherto overlooked. The deaths from phthisis were 437 in the towns and 351 in the country districts to 100,000 living.

That this increased mortality has its relations to the directly increased dangers of infection may be seen from the investigations on the relative number of germs and amount of organic impurities in houses with different numbers of rooms, by Prof. Carnelley, of Dundee, as set forth in the III chapter of this Report. Everywhere, but especially in the dwellings of the poor, are seen crowding and uncleanness, and food, poor both in amount and quality, and in its preparation.

The following from the Local Government Board's Report for 1889 shows the necessity for attention to this source of disease :

“Milk continues to be the chief subject of analysis, out of 26,344 samples of various articles of food, drink and drugs, no less than 10,859 were of what professed to be milk, of which 11.9 per cent. were condemned ; while in one of the London districts, St. Pancras, out of 129 samples no less than 55, or nearly 45 per cent., were condemned.”

The following instance illustrates the enormity of the crime of adulteration and the inadequacy of the fine to prevent adulterating :

“In another case in which the milk vendor stated that he rarely sold more than a farthing's worth at a time, the sample taken was found diluted with 15 per cent. of water, but the magistrate considered that one shilling was an adequate fine. On this decision the public analyst comments as follows :—“It is these small portions of milk which are used to fill the bottles of young children, and are often diluted by the parents after the purchase, and thus it is impossible to say how weak the milk becomes before the same is used, but it is not very difficult to understand why the mortality amongst the children of the poor is so great.”

As might be inferred the dangers minimized by the small amount of milk used by the poorer classes, is on the other hand increased from their milk supply, of the poorest quality, being more likely to come from dairies, inferior both as regards the healthfulness of the cows, and the cleanliness of their surroundings. The high mortality amongst the children of the poor may fairly be charged, in large part, to the marasmus arising from mal-nutrition due to insufficient and unwholesome food.

Under these conditions it is plain that whatever inherited weakness there may be, the subsequent conditions result in a lessening of the natural resistance of the system to disease. Councilman well illustrates the difference in the resisting power of different individuals by the amount of connective tissue formation thrown around infected points, as a cavity or miliary tubercle. He says : “In some cases (in autopsies) almost nothing of this is seen, and the disease passes rapidly into inflammation and caseation. These differences show themselves in different organs of the body and indurated and healed apices of lymph and bronchial glands are common.” Referring to the assumed predis-

position in combatting hereditary tuberculosis, he further says: "All conditions of life which produce a low state of vitality in the system predispose to consumption."

Turning then to some of these, in addition to what has been said regarding improper and deficient food, we would place first overcrowding.

Overcrowding.—The following statistics re increase of general mortality according to the population per acre is of interest:

James T. Hummach, F.S.S., Assistant-Superintendent of Statistics, Registrar-General's Office, says, speaking of the "Relation between Density of Population and Mortality from Consumption": "The facts about to be adduced will show that density of population, so far from being an unimportant element with regard to the mortality from consumption, is, in fact, a very potent agent in producing that fearful and destructive malady."

"Overcrowding is of two kinds: (1) on the superficial area, (2) in cubic space; and either may exist independently of the other. In the country where there is no overcrowding, a labourer's cottage may be so overcrowded by its inmates that disease may break out; while in the case of model lodging-houses and many well-constructed public institutions, it is quite possible, by a suitable construction of buildings, to have a dense population living healthily because occupying a large cubical space."

TABLE No. 4.

Groups of 10 districts each.	Density.	Annual rate of mortality per 100,000 living.	
	Square yards to each person.	From phthisis.	Other diseases of the respiratory organs.
No. 1.....	180	375	659
" 2.....	119	405	771
" 3.....	35	485	914

"Thus in the districts with the least density the deaths from consumption were 375, and in those of most density 485, to 100,000 living; while other lung diseases caused 914 deaths in the densest, against 659 in the least dense districts, out of the same numbers living—the deaths out of the living, not the proportion they bear to the mortality from all causes, being the true index to the fatality of particular diseases."

In the Registrar-General's report the mortality from different diseases in London and twenty-four other city districts, with an aggregate population of 3,769,000, was contrasted with the mortality from the same diseases in counties containing a population of 3,559,000, chiefly engaged in agriculture.

The urgent necessity for increased attention to the dangers in childhood is illustrated by statistics. Thus the Registrar-General of England has shown that while the death-rate per million, from phthisis, and tubercular brain disease, since 1861-70 has decreased, that from tabes mesenterica and scrofula has increased, thus

	Phthisis.	Hydrocephalus and Tubercular Meningitis.	Tabes Mesenterica.
1861-70.....	963	2213	2267
1871-80.....	767	1800	2558

With the malnutrition which plays so fatal a part in those with such a tendency, as in infants, we can see that the tendency is by no means at an end with the teething period.

Predisposing causes.—While much has been said and written on this subject, daily evidence goes to show that insanitary conditions under all circumstances, and understood as applying to every state and stage of human existence are the largest factor in the causation of consumption.

Amongst other influences we have those of heredity.

Popular and professional opinion have both, until recent years, accorded to heredity the principal exciting cause of consumption; but the most scientific teaching of the present day is that all that is inherited, is a tendency due to imperfect development, not of the organism in its gross or composite form, but of the structural or cell elements of its tissues. It will be manifest that if the delicate mother has a child weak at birth, it is probable in the very nature of things that it will be imperfectly nourished by her, and the innate tendency will rather be developed than lessened. That this is true seems to be borne out by the fact of the enormous numbers of children dying within the first year or two of birth from tuberculosis of the intestinal tract and neighboring glands.

Cornil has shown that the bacilli are taken into the system, without any necessary abrasion of the mucous membrane; and that the intestinal tract should be the common avenue of infection in children will be accepted without discussion.

Again, according to Hirsch, "Smith has ascertained for one thousand persons treated for consumption at the Brompton hospital, that seventy per cent. of them had been in the habit of spending their time in overcrowded, hot and dusty places indoors." "The same circumstances seem to account for the strikingly common occurrence of phthisis in nunneries, seminaries and such institutions, in evidence whereof a number of observations have been brought forward by Foucault." Amongst the latest of such observations are those of Cornet of Berlin. For the purposes of study he has taken the statistics of mortality from twenty-eight of the cloisters of Germany during 25 years, including brotherhoods and sisterhoods having an average population during these years of 4,028.28. The members of these sisterhoods had for the most part devoted themselves to the duties of nurses. He found that the life-period of each inmate amounted to a total of 87,450 years, or an average life-period of 21.6 years. The total deaths were 2,099 and 1,320 were of persons who died of tuberculosis. In one sisterhood having a yearly average of 37 persons there were during 22 years 10 deaths, all of which were due to tuberculosis. He further found, as seen in the following table, that the mortality in especially the several first quinquennia of conventual life, during which the sisters were especially engaged in the more menial duties of cleansing floors, washing clothes, etc., as compared with that of the whole state was relatively enormous. From these figures he draws the conclusion that a healthy girl entering a sisterhood at seventeen dies 21.5 years earlier than her sister belonging to the general population of the state; and that such an inmate in her twenty-fifth year stands in regard to expectation of life in the same class as a female in the outer world at the age of fifty-five, and a sister of thirty-three in the same class as a female outside at the age of sixty-two.

Number of Deaths from Tuberculosis per 1,000 Population in Cloisters in Germany during 25 years.

	Age-periods.						
	15-20	20-25	25-30	30-40	40-50	50-60	Over 60.
Deaths from all causes in—							
State	4.83	6.83	8.13	10.60	14.39	23.87	55.68
Hospitals and cloisters	20.46	21.67	23.91	19.48	15.00	19.30	58.41
Deaths from tuberculosis in—							
State	1.86	2.99	3.60	4.18	4.79	6.61	7.30
Hospitals and cloisters	11.69	13.73	17.62	14.21	8.83	4.73	8.88
Number of deaths from tuberculosis to every 100 deaths in—							
State	37.86	43.01	43.56	39.38	32.78	26.89	17.88=23.78
Hospital and cloister	60.87	67.49	73.73	73.84	57.93	28.67	19.00=62.89

Finally it may be stated that in the Report of the Inspector of Prisons and Public Charities in Ontario for 1890, where the public institutions have by all observers received high commendation, the aggregation of population would seem to produce similar results. Thus of a total population in the insane asylums amounting to 3,500, having 231 deaths or 65 per 1,000, there were 29 due to phthisis, *i. e.*, 12 per cent. of the whole or 8.28 per 1,000 of the population.

Influence of Infection.—The influence both of hereditary tendency and of infection is similarly acutely illustrated by statistics taken from Ontario death returns in the three old-settled counties of Prince Edward, Welland and Lincoln, during a period of eleven years. The total deaths from consumption are given in each case, and the number of persons of the same name dying from the disease in successive years are indicated by numerals instead of the names being given.

Deaths from Consumption during 11 years in three Ontario Counties.

Counties.	Total No. of deaths.	Total names.	Total names repeated.	Per cent. of whole deaths occurring of names repeated.	Average number of times each name is repeated.	Total names occurring in the same year.	Percentage of total number of deaths from all causes during 11 years.
				per cent.			
Welland	404	285	71	25	2.67	In 1 case four occurred	10.21
Prince Edward	330	198	86	43	2.53	In 3 cases three “	11.3
Lincoln	450	330	195	43	2.6	In 23 “ two “	9.9
						In 22 “ “	
						In 2 “ three “	
						In 30 “ two “	
						In 1 case three “	

Deaths from Consumption in the Ontario Counties of Prince Edward, Welland and Lincoln during the years 1881 to 1891 in cases where deaths of persons of the same name occurred twice or oftener, and the years in which such occurred.

PRINCE EDWARD.

Family name represented by a numeral.	Total No. of times it oc- curred.	Year or years in which deaths occurred.	Family name represented by a numeral.	Total No. of times oc- curred.	Year or years in which deaths occurred.
1	2	1884:1 1888:1	45	2	1881:1 1890:1
2	2	1885:1 1886:1	46	2	1881:1 1890:1
3	2	1885:1 1887:1	47	2	1881:1 1890:1
4	2	1885:1 1889:1	48	2	1881:1 1887:1
5	2	1885:1 1886:1	49	2	1881:1 1884:1
6	2	1885:1 1886:1	50	2	1881:1 1882:1
7	2	1885:2	51	2	1881:1 1890:1
8	2	1885:1 1886:1	52	2	1881:1 1887:1
9	2	1886:1 1888:1	53	3	1884:1 1885:1 1886:1
10	2	1886:1 1889:1	54	3	1885:1 1890:2
11	2	1886:2	55	3	1885:1 1886:1 1888:1
12	2	1886:1 1891:1	55	3	1882:2 1883:1
13	2	1886:2	56	3	1882:2 1884:1 1890:1
14	2	1883:1 1884:1	58	3	1883:1 1884:1 1887:1
15	2	1883:2	59	3	1883:1 1890:2
16	2	1883:1 1891:1	60	3	1883:2 1886:1
17	2	1883:1 1887:1	61	3	1883:1 1884:1 1891:1
18	2	1884:1 1888:1	62	3	1884:1 1885:1 1886:1
19	2	1884:1 1885:1	63	3	1889:1 1890:1 1891:1
20	2	1887:1 1888:1	64	3	1882:3
21	2	1887:1 1890:1	65	3	1882:2 1885:1
22	2	1887:1 1889:1	66	3	1882:1 1888:1 1889:1
23	2	1888:1 1890:1	67	3	1882:1 1885:1 1886:1
24	2	1888:2	68	3	1881:1 1882:1 1885:1
25	2	1888:1 1890:1	69	3	1881:1 1882:1 1886:1
26	2	1888:1 1891:1	70	3	1881:1 1885:1 1891:1
27	2	1889:1 1891:1	71	3	1881:1 1886:1 1883:1
28	2	1889:1 1891:1	72	3	1881:1 1887:1
29	2	1890:1 1891:1	73	3	1881:1 1885:1 1890:1
30	2	1890:2	74	4	1885:1 1886:1 1889:2
31	2	1881:1 1890:1	75	4	1881:1 1882:1 1884:1 1887:1
32	2	1881:1 1884:1	76	4	1882:1 1885:2 1891:1
33	2	1882:2	77	4	1881:2 1889:1 1885:1
34	2	1882:1 1883:1	78	5	1882:1 1883:1 1884:2 1888:1
35	2	1882:1 1889:1	79	5	1881:2 1886:1 1887:1 1891:1
36	2	1882:1 1891:1	80	6	{ 1882:1 1890:1 1884:1 1885:1
37	2	1881:1 1889:1			{ 1887:1 1889:1
38	2	1882:1 1885:1	81	6	1882:2 1886:1 1888:2 1890:1
39	2	1882:1 1887:1	82	7	1882:3 1883:1 1885:1 1888:2
40	2	1882:1 1884:1			{ 1881:1 1882:1 1883:2 1886:1
41	2	1891:1 1891:1	83	8	{ 1888:1 1889:1 1890:1
42	2	1881:1 1888:1			{ 1881:1 1883:2 1885:1 1886:1
43	2	1881:1 1884:1	84	11	{ 1888:3 1889:1 1891:2
44	2	1881:1 1884:1			

WELLAND.

Family name represented by a numeral.	Total No. of times it occurred.	Years.	Family name represented by a numeral.	Total No. of times it occurred.	Years.
85	2	1881:2	123	2	1883:1 1886:1
86	2	1881:1 1886:1	124	2	1884:1 1890:1
87	2	1881:1 1890:1	125	2	1884:1 1890:1
88	2	1881:1 1889:1	126	2	1884:2
89	2	1881:1 1885:1	127	2	1886:1 1888:1
90	2	1881:1 1885:1	128	2	1886:1 1889:1
91	2	1881:1 1884:1	129	2	1887:1 1890:1
92	2	1881:1 1885:1	130	2	1887:1 1890:1
93	2	1881:1 1882:1	131	2	1887:1 1890:1
94	2	1881:1 1891:1	132	2	1890:2
95	2	1881:1 1890:1	133	2	1890:2
96	2	1881:2	134	2	1891:1 1889:1
97	2	1882:1 1886:1	135	3	1881:1 1882:2
98	2	1882:1 1887:1	136	3	1881:1 1888:1 1890:1
99	2	1882:1 1885:1	137	3	1881:1 1887:1 1890:1
100	2	1882:1 1883:1	138	3	1882:2 1885:1
101	2	1882:1 1886:1	139	3	1882:1 1888:2
102	2	1882:1 1885:1	140	3	1882:1 1884:1 1890:1
103	2	1882:1 1885:1	141	3	1882:1 1884:1 1886:1
104	2	1882:1 1884:1	142	3	1882:1 1886:1 1890:1
105	2	1882:1 1884:1	143	3	1882:2 1887:1
106	2	1885:2	144	3	1885:1 1886:1 1887:1
107	2	1885:1 1887:1	145	3	1883 1888 1889
108	2	1884:1 1888:1	146	3	1884 1885 1887
109	2	1884:1 1885:1	147	3	1884:1 1885:1 1886:1
110	2	1885:1 1891:1	148	3	1887:2 1890:1
111	2	1886:2	149	4	1881:1 1885:1 1886:1 1889:1
112	2	1892:2	150		1886:2 1889:1 1891:1
113	2	1891:1 1889:1	151	4	1883:1 1887:1 1888:1 1890:1
114	2	1891:2	152	4	1887:2 1889:1 1890:1
115	2	1889:2	153	5	1881:1 1887:2 1890:1 1891:1
116	2	1882 1889	154	5	1885:1 1886:3 1891:1
117	2	1883:1 1890:1	155	6	{ 1882:2 1883:1 1884:1 1885:1 1887:1
118	2	1883:1 1884:1	156	6	1885:1 1886:1 1887:1 1888:3
119	2	1885:1 1890:1	157	7	1882:1 1885:1 1888:4 1889:1
120	2	1883:1 1889:1	158	10	{ 1881:2 1883:1 1884:1 1887:2 1888:1 1889:3
121	2	1883:1 1884:1			
122	2	1883:1 1885:1			

LINCOLN.

Family name represented by a numeral.	Total No. of times it occurred.	Years.	Family name represented by a numeral.	Total No. of times it occurred.	Years.
159	2	1881:1 1883:1	192	2	1886:2
160	2	1881:1 1887:1	193	2	1886:1 1891:1891
161	2	1881:1 1887:1	194	2	1886:2
162	2	1883:1 1889:1	195	2	1886:1 1891:1
163	2	1883:1 1890:1	196	2	1886:1 1891:1
164	2	1883:1 1890:1	197	2	1886:1 1888:1
165	2	1883:1 1884:1	198	2	1886:1 1890:1
166	2	1883:1 1888:1	199	3	1883:2 1886:1
167	2	1883:1 1885:1	200	3	1882:1 1884:1 1887:1
168	2	1883:1 1888:1	201	3	1883:1 1888:1 1890:1
169	2	1883:1 1885:1	202	3	1881:1 1889:2
170	2	1881:1 1887:1	203	3	1881:3
171	2	1881:1 1883:1	204	3	1881:1 1886:1 1888:1
172	2	1881:1 1886:1	205	3	1881:1 1886:1 1887:1
173	2	1881:1 1887:1	206	3	1884:1 1886:1 1890:1
174	2	1884:2	207	3	1885:1 1886:1 1889:1
175	2	1884:1 1888:1	208	3	1885:1 1886:1 1887:1
176	2	1884:1 1888:1	209	3	1886:1 1890:1 1891:1
177	2	1884:1 1889:1	210	3	1886:1 1887:1 1891:1
178	2	1884:1 1888:1	211	4	1881:2 1883:2
179	2	1890:2	212	4	1881:1 1885:1 1886:1 1887:1
180	2	1890:2	213	4	1881:2 1887:1 1890:1
181	2	1885:1 1889:1	214	4	1884:1 1890:2 1891:1
182	2	1885:1 1888:1	215	4	1884:2 1886:1 1888:1
183	2	1885:1 1890:1	216	4	1886:1 1889:2 1891:1
184	2	1885:1 1887:1	217	5	1883:1 1888:2 1889:2
185	2	1885:1 1887:1	218	5	{ 1881:1 1883:1 1887:1 1888:1
186	2	1886:1 1889:1			{ 1891:1
187	2	1886:2	219	5	1884:2 1886:1 1888:2
188	2	1886:2	220	5	1884:1 1885:1 1886:1 1890:2
189	2	1886:1 1889:1	221	6	1884:2 1885:2 1886:1 1887:1
190	2	1886:1 1890:1	222	7	{ 1881:2 1884:1 1886:1 1887:2
191	2	1886:2			{ 1891:1

Setting forth therefore the conclusions based upon these studies it may be said :

1. That we must recognize the disease tuberculosis as being beyond question a contagious disease belonging to the category wherein are placed glanders and leprosy.

2. This being true beyond question, the attitude which must be assumed by officers of health is to treat it as such, and hence they must examine into what practical measures are to be taken for preventing it and, so far as possible, limiting its dissemination from those centres where they find it existing.

3. Arguing by inferences fairly drawn from the numerous statistics already presented, we must primarily regard the question of dealing practically with the problem as being one which appeals to the active sympathies of every one, whether as an individual, a physician or a health officer.

4. This means that the extinction of phthisis must be looked for by our dealing with it as with diphtheria and other diseases of its class, and hence we must endeavor—

(a) To prevent it by removing the causes which promote it.

(b) By so regulating the habits and lives of those affected with it, as to prevent them from becoming sources of infection to the healthy.

(c) By the establishment of hospitals and sanatoria where those infected may have the best possible opportunities of being cured of the disease.

Referring to these points in their order as regards the prevention of the disease we must look to the private life or family home of the people.

Here the matters specially to be enquired into are :

1. The removal of dampness, both under and around houses, as also the removal of all wood or other organic matter tending to decay or promote fungoid growth.
2. The establishment of efficient and complete plumbing and drainage.
3. The introduction of a pure water supply.
4. The maintenance of purity of the atmosphere of the house, by cleanliness, ventilation and the abundance of sunlight.
5. Proper and equable heating of living rooms.
6. Attention to the clothing of people, whether in the house or out of it. It must be clean, non-conducting and sufficient.
7. The use of nutritious and wholesome food, notably of animal foods, as meat and milk, etc.

These considerations require that we follow the people to :

The school, and see that those desiderata required for the healthy home be had in the school ; the work-room and shop where there is the constant difficulty of overcrowding and uncleanness ; their trade or occupation, notably to our woollen factories, where animal materials are handled ; the works where stone-cutting, grinding, etc., are carried on, and to those where effluvia and poisonous particles are given off, as in painting, card-glazing, arsenical manufacturing, etc.

In these directions indeed, our labors must simply be neverceasing, for dangers to health are almost as multifarious as the different industries carried on.

We have next to supervise the municipal home of the people :

Here we have to deal with the large problem of municipal sanitation. This means (a) town drainage ; (b) town sewerage ; (c) town paving ; (d) public waterworks ; (e) inspection of filth nuisances ; (f) compulsory notification of cases of consumption.

Referring especially to that phase of this problem, which ought and can be dealt with at once, since we have the matter wholly under the control of physicians and boards of hospital trustees, it is of interest to examine the few available data in connection with the hospitals in Ontario. These are public institutions supported by government grant, municipal funds and private subscriptions and by individual benevolence.

By reference to the Annual Report of the Inspector of Public Charities for 1892, it is found that there were returned from the various hospitals in Ontario 11,404 cases as admitted, and that of these there were 11,008 suffering from various enumerated diseases, leaving 396 of which no record is given. An analysis of these diseases gives the following :

Caries	127	Tuberculosis of joints	19
Necrosis	74	Tuberculosis of glands	4
Rickets	12	Chronic bronchitis	196
Synovitis	40	Tuberculosis	353
Hip joint disease	78		

Under tuberculosis, are included diseases returned as hæmoptysis, laryngeal tuberculosis and tubercular phthisis. In addition to the above list of pneumonic diseases there were 197 cases of acute bronchitis, and 277 of pneumonia. Of course it is impossible to state how many of the latter proved to be tubercular, but we may fairly assume that there were at least as many tuberculous cases as are included in the above list. Of these the first six classes amounting to 350 cases may be considered as not being infectious under ordinary conditions, while the latter three classes, including 353 cases of tuberculosis, may be considered as being more or less infectious. In other words, 5 per cent.

of the total inmates of our hospitals suffered from this contagious disease. This would mean that there would be one infectious tuberculous case for every ward of twenty beds. Doubtless most of these cases were charity patients, as it is not a common occurrence for the well-to-do tuberculous patient to go to an hospital for treatment.

As yet there is not in the whole Province an hospital for consumptives, and special wards are not, as my information goes, specially assigned to this class of sufferers. If this be true then it is apparent that patients sick from other causes and placed in wards with consumptives may become infected if infectious tuberculosis be present. Unfortunately the report gives no details as to the length of time during which these patients remained in hospitals; but it may be assumed that many were there for months during the later stages of the disease. Patients suffering from other diseases could in some instances be exposed for considerable periods to whatever contagion was present. Regarding the presence of such contagion we are not without experimental evidence. Prof. Cornet, of Berlin, has found the bacillus of tuberculosis in the dust of wards for consumptives in hospitals, in the dust of rooms in which consumptives live, and in the dust of railway carriages conveying many consumptives to the health resorts of the Riviera.

Perhaps, however, we may form some idea of these contagious influences from the statistics which already have been given regarding the excessive mortality amongst the nursing sisterhoods in Germany. As to the positive influence of residence in wards of hospitals where the tuberculous patients are present, we would seem to have positive proof in the following table taken from the returns of deaths in the Asylums for Insane of Ontario during 1892. While these are imperfect so far as the age at which patients entered these institutions is concerned, and while it may be assumed that those entering during the year were younger than those present for the longer periods and therefore rather more susceptible to any existing contagion, yet the difference of one or two years of age is wholly insufficient to explain the enormously increased percentage of those dying from tuberculosis to the total deaths during any year. It will not of course be forgotten on the other hand that the debilitating effect of confinement due to mental disease must tend to make the physical system less resistant to any specific contagion present.

Table giving the total Deaths in Ontario Asylums (exclusive of Mimico) during 1892 from Tuberculosis in a population of 4,231, the total Deaths from all causes being 211.

Period of residence.	Total deaths.	Deaths from Tuberculosis.	Percentage of total deaths.
Under 1 year.	72	7	9.7
Between 1 and 2 years.	25	5	20.0
“ 2 and 3 “	40	9	22.5
“ 5 and 10 “	19	10	52.6
“ 10 and 15 “	16	6	37.5
“ 15 and 20 “	15	2	13.3
Over 20 years.	24	2	8.3
Total.	211	41	23.4

But it is not alone in public institutions that these malign influences produce their deadly effects. If the table of deaths in the three old Ontario counties be examined, the influence of propinquity is equally evident. While it may be urged that owing to patients in asylums or hospitals suffering from some other disease, they merely have their resistance to the infection of consumption reduced, yet it cannot be said that heredity in such instances is enough to account for the excessive mortality from consumption; in these institutions it was, doubtless, in many instances, due to direct contagion. On the other hand if heredity play its role in certain county families it cannot be said that other diseases have lessened resistance in such to infection. Thus, in Prince Edward county, out of 198 names, 86 are repeated 2.53 times; in Welland, of 285 names 71 are repeated 2.67 times; and in Lincoln, of 330 total names 195 are repeated 2.6 times.

Examine the problem as we may infection appears as the dominating influence. What is being done or what is possible to avert the efforts of this malign influence? What appears at once a partial solution of the hospital and asylum problem is the isolation in certain wards, or better still, in certain buildings of all tuberculized patients. There can no longer, if statistics teach us anything, be any hesitation in accepting the view of the contagious nature of the disease. Twenty-five years ago small-pox was treated in the wards of many hospitals. That day is past. To-day diphtheria and scarlatina no longer find easy entrance in this Province to the wards of general hospitals, and then only to be treated in isolated apartments. It does not seem possible to longer delay the question of isolation wards for consumptives, and the construction of homes for consumptives. Regarding this latter matter public sentiment needs only to be aroused, and some way to the attainment of the end pointed out, when doubtless the means will be found. The results of sanatoria in certain elevated climates in the treatment of consumptives are now known to all physicians. The dryness of the atmosphere, the open air life, the exercise and attention to hygiene are the well known elements in effecting a cure or prolonging life. The essential differences between house atmospheres and external air have been in the previous pages of this Report demonstrated and dwelt upon in many tables and in many experiments. Shall it not be possible to bring these conditions within the reach of our own citizens? The relative freedom of the central plateau of Ontario has already been referred to; but the following table of deaths in several upland districts even in the County of York further illustrates the fact.

Deaths from Tuberculosis in Whitchurch, Vaughan and King Townships, County of York for the 5 years, 1888-92.

Population.	Total Deaths.	Total family names.	Deaths per 1,000 per annum.
4,019	11	11	.54
6,067	25	20	.80
5,292	16	15	.60

We have, as already stated, a yearly mortality from tuberculosis in Ontario, greater than from any other single cause amounting in 1891 to 734 or 2.0 per 1,000 of the population. We have thousands of persons now suffering from tuberculosis in as many houses in Ontario; we have in crowded work-rooms and in every factory valuable adult lives daily exposed to the irritating influences on the respiratory tract of the dust in these factories, to which is added the fatal virus from many tuberculized fellow-workpeople, and we have in the very measures taken by the state and municipalities for the alleviation of suffering, vehicles for the further transmission of this fatal malady. Why should the matter remain thus? In many of our progressive counties, intelligent legislators, aided by benevolent citizens, have undertaken in a systematic manner to find *Homes for the Poor*. In Ontario in 1891 there were nine county poor-houses receiving Government aid, and supported by the counties to the extent of \$177,500 in value, and taking care of 527 persons, as seen in the following table:

Houses of Industry in Ontario in 1891.

Total number of counties in 1891.	Total acreage in industrial farms.	Average acreage.	Total value of buildings and property.	Average value of buildings and property.	Total number of inmates.	Average number per county.
9	586	65	\$177,500	\$18,722.22	527	58.55

Substantial buildings have been erected, farms have been bought and donated and facilities have been supplied for enabling these poor not only to live healthful lives, but by their labor to aid in maintaining themselves.

For an infinitely more deserving class, found in every grade of society, the young, the beautiful and unfortunate, can we do nothing? It cannot be! Society and the state look to those who have devoted their lives to the amelioration of human suffering and the drying of tear-dimmed eyes for help and guidance in this matter. The medical profession and sanitarians, whether professional or engaged in the everyday practice of this modern religion, are, by such a melancholy story as that told in the foregoing statistics, called upon to lead the crusade against the one foe, which from earliest historic times has found his easy victims in every home and in every class of society; that has wasted most the strength of the wage-earner whose labor was demanded for the support of those who in their holy devotion to him in the losing struggle of his waning life, have soothed his dying hours only to find themselves following as easier victims to the appetite of this insatiate monster, who yearly from a thousand homes steals the fairest and loveliest—readiest victims at the moment when budding youth is blooming into fairest manhood and womanhood. We dream not of his complete destruction so long as the bitter struggle for life makes many to bow under their Atlantean burden; we cannot believe that the enervating influences which dissipate the strength of youth will ever fail to produce their legitimate and bitter fruit, nor that society as a whole can be so highly enlightened as to know or knowingly follow the path by which the hidden dangers from this insidious foe can be averted; but we do hope that from year to year the prayer of Tennyson, “Let knowledge grow from more to more,” may in some degree find its realization in practical measures, which have been so fully shown to be successful in lessening the dangers which flow from a disease which is the bane of humanity from infancy to old age. By succeeding in this work we shall best fulfil the maxim, “*Angustis hunc addere rebus honorem.*”

P. H. BRYCE.

PART II.

I. THE CHAIRMAN'S ANNUAL ADDRESS.

BY J. J. CASSIDY, M.D., TORONTO.

To the Members of the Provincial Board of Health :

GENTLEMEN,—To day, the most striking fact in the sanitary world is the deep seated and universal dread of cholera, both in Europe and America. The daily papers, the literary magazines, the medical and health periodicals are incessantly full of this topic—the people will not, then, be asleep. Fortunately they are ready and willing to follow their sanitary advisers to the fullest extent. In our own country, this year, the Federal Government has taken a forward step, by assembling at Ottawa a conference of heads of Provincial Departments and sanitary experts, in order to consider the relations between Dominion and Provincial sanitation, and to recommend any necessary improvements in the quarantine of Canadian maritime and inland ports. The conference met in the Department of Agriculture at Ottawa, January 31, at 2 p.m., the following gentlemen being present: Mr. Lowe, Deputy Minister of Agriculture, representing the Federal Government; Hon. J. M. Gibson, Hon. R. Harcourt and Hon. Mr. Bronson, representing the Provincial Government of Ontario; Hon. L. P. Pelletier, the Provincial Government of Quebec; Hon. James Mitchell, the Provincial Government of New Brunswick; Hon. Senator Macdonald and Mr. L. H. Davies, M.P., the Provincial Government of Prince Edward Island; Dr. Cassidy, Chairman Provincial Board of Health, Ontario; Dr. Bryce, Secretary; Dr. Lachapelle, Chairman Provincial Board of Health, Quebec; Dr. Pelletier, Secretary; Dr. O'Donnell, Manitoba; Dr. Davies, British Columbia. Nova Scotia was unrepresented. Dr. Montizambert, Medical Superintendent of the Grosse Isle Station, was present at the request of the Minister of Agriculture. The work of preparing a report, showing the duties and responsibilities to be assumed respectively by the Dominion and Provinces, in the matter of taking precautions against, and dealing with any threatened invasion of Asiatic cholera was entrusted to the following committee: Dr. Cassidy, Dr. Bryce, Dr. Lachapelle, Dr. Pelletier, Hon. Mr. Mitchell, Dr. O'Donnell and Senator Macdonald, with instructions to report to the conference next morning at 10 a.m. This was done and the report of this committee was adopted at the ensuing session of the conference, February 1st.

At this meeting Hon. Mr. Angers, Minister of Agriculture, was present and presided.

This concluded the work of the conference, with reference to preparing defences against cholera. A special session was, however, devoted to considering the best means of providing for the collection, compilation and publication of the vital statistics of the Dominion. The conclusions arrived at by the conference on this important subject form part of the report. The report of the sub-committee, which was adopted by the conference, is as follows:

"1. That the following maritime quarantine stations, namely, Grosse Isle, Halifax, St. John and William's Head, should be equipped with deep-water wharves, steam cylinders, tanks for bichloride of mercury solution, sulphur dioxide blasts, suitable water supply, hospital and accommodation buildings for the detention of the various classes of passengers, and with such other requirements as pertain to first-class stations, and that Chatham, New Brunswick, be also equipped with all the appliances necessary for a quarantine station on the Gulf coast.

"2. That, in the opinion of the committee, it is necessary that provision be made, whereby quarantine inspection, by properly trained medical officers, be established at

Rouse's Point, St. Alban's, Niagara Falls, Ontario, McAdam's Junction, and such other ports of entry from the United States, as may be decided upon as necessary, according to circumstances; and that such ports of entry be equipped with disinfecting plant, houses of detention, and such other appliances, as may be necessary for efficiently protecting the country, against the invasion of cholera. Further, that at Winnipeg, the *entrepot* of immigrants east and west, a fully equipped quarantine station be established and maintained.

"3. That, in the opinion of the committee, it is urgent in the public interest, that the supervision of the various quarantine stations be under the charge of an experienced quarantine officer, appointed by the Federal Government, who shall direct such quarantine measures as the emergency shall demand for the protection of the country; and who shall, from time to time, inspect such stations, with a view to maintaining them in a state of efficiency.

"4. That, in the case of vessels coming from foreign ports, they shall report for medical inspection before receiving customs entry. Should infectious disease have occurred during the voyage, or cases of infectious disease be found on board, the medical officers appointed by the Government shall order the said vessel to report for inspection and disinfection at the nearest quarantine station.

"5. That, in the opinion of the committee, it is necessary for the safety of Canada that the baggage of every immigrant coming into this country during periods of foreign epidemics, be disinfected by the methods already recommended by the committee, and that such disinfection be performed at a regularly appointed station.

"6. That vessels coming from infected European ports, no cases of infectious diseases having occurred on board during the voyage, should be thoroughly disinfected at a regular quarantine station.

"7. That vessels, having had cholera on board during the voyage, should be disinfected and detained at quarantine during seven days from date of last case.

"8. That in the opinion of the committee, it is necessary, during epidemic periods, that immigrants be followed to their destination. That this can be done, by the Government insisting that every shipping company shall provide each immigrant, while on ship-board, with a health ticket of form satisfactory to quarantine and provincial health officers, which shall be a passport of health to the point of destination, and be accepted by officers wherever inspection takes place. All municipal health officers should also be notified of any immigrants arriving within their districts, by letter, or by telegram, from the quarantine to a provincial or state health officer.

"9. The following rules do not apply to immigrants, who are provided for elsewhere:

"(a) When a train arrives at the railroad station, and the passengers do not come from a place where disease is epidemic, they will be allowed to proceed.

"(b) When passengers are not sick, but come from an infected place, their soiled clothing will be disinfected and they will be allowed to proceed, on condition that they report to the clerk of the municipality to which they are bound. The quarantine officer will notify said clerk, and also the Provincial Board of Health.

"(c) When there are passengers sick, or apparently sick from an infectious disease, they will be landed at the infectious disease hospital. Passengers occupying the same car will be detained for forty-eight hours, and the effects which they brought on the same car will be disinfected. They will then be released, on condition that they report to the clerk of the municipality to which they are bound. The quarantine officer will notify such clerk, and also the Provincial Board of Health.

"(d) Passengers travelling through Canada, with no intention of remaining in the country, who are only suspected of having infectious disease, will be allowed to proceed to their destination, the quarantine officer notifying the Provincial or State Board of Health to which they are bound.

"(e) The cars, in which there have been sick persons, shall be disinfected.

"(f) Cars, coming from an infected district, will have to be provided with latrines, containing disinfectants.

"10. Should the United States Government adopt a twenty days' quarantine against cholera in 1893, the Federal Government of Canada should enforce the same rule against

immigrants, who may wish to travel from European ports through Canada to the United States.

"11. When cholera is epidemic abroad, the importation of rags from, or collected in, infected countries should be prohibited.

"12. Cars containing merchandise, which is susceptible of infection, (baggage, wearing apparel, rags, hides, leather, feathers, horse hair, animal remains in general, unbaled manufactured wool, etc.), coming from an infected district, should be properly disinfected."

It was moved by Dr. Bryce and seconded by Dr. O'Donnell, that the report as read be adopted. Carried.

At a subsequent meeting held at 8 p.m., February 1st, it was moved by Dr. Cassidy and seconded by Dr. Pelletier: "That the report of the sub-committee be amended by adding to it certain resolutions containing further recommendations." Carried.

Moved by Dr. Bryce and seconded by Dr. O'Donnell, "That in the opinion of the conference, it is urgent that the various provincial health organizations do carry out thoroughly the work of municipal inspection with regard to: (a) The protection of public water supplies. (b) The systematic disposal of garbage. (c) The disposal of manure and lane and road refuse. (d) The cleansing of polluted creeks, bays, etc., in the various municipalities along the lines of railway and elsewhere, and those municipalities be required to supply medical officers, places of detention and disinfecting appliances to render innocuous any cases of cholera, which may occur within provincial jurisdiction." Carried.

It was moved by Dr. Cassidy, and seconded by Dr. Pelletier, "That the conference urge upon those provinces having no Provincial Boards of Health, or other official health organization, that their legislatures do take early action towards passing legislation providing for the establishment of such boards, both for their own protection and that of neighboring provinces." Carried.

It was moved by Dr. Bryce and seconded by Dr. Cassidy, "That a copy of the report of the proceedings of the conference be furnished to each of its members and also to the several Provincial Governments represented." Carried.

The conference then dissolved.

The Federal Government has already intimated what course it intends to pursue, with regard to these recommendations. I may say there is good reason to hope, that nearly all of them will be carried into effect.

The Board will remember that, at a special meeting held on September 17th, 1892, certain regulations in the matter of cholera were adopted, which were afterwards passed by Order-in-Council. Your committee on legislation desires to report on these regulations and to ask you to consider the advisability of making certain amendments. The text of the former Order-in-Council and the proposed amendments will be laid before you for your consideration. Another important matter, which will claim your attention, will be the revision of Pamphlet No. 15, entitled, "Rules for Checking the Spread of Contagious and Infectious Diseases."

The committee on publication has revised this pamphlet, and the text of the work, together with the proposed amendments, will be submitted for your consideration.

The committee on publication has further revised, and will present for the consideration of the Board the pamphlet on Disposal of Sewage.

Recognising as we do, the imminent danger that is present in the use of sewage-polluted water, and the readiness with which it becomes charged with the comma bacilli, we cannot but look with positive dread at the condition of Toronto's city water supply. Viewed in the light of the epidemic at Hamburg last summer, one would almost say that the municipal authorities of this city are trifling with the grave danger at their gates, instead of taking these well-known and efficient precautions, by which an inferior may be converted into a first-class water. The condition of the people of Toronto during this winter in the matter of water supply has been positively pitiable. One does not require to be fastidious to object to drinking "boiled sewage," and yet that is really the best water to be obtained in this city at the present time. Beside this, children and occasionally their elders, forgetful of the foul condition of the water, have taken it in its unboiled condition, and in numerous instances have been troubled with severe diarrhœa.

Typhoid fever is also increasing. Even if the pipe extending across Toronto bay is made tight, there is no guarantee that it can be kept so, and the Toronto water supply will therefore continue to be of a very uncertain or even dangerous character.

For protection from fire and mechanical purposes it is sufficient; but for potable purposes it is unfit. Under these circumstances, would it not be better for Toronto people to cease agitating for another supply, and to devote their energies and their money to the filtration of that which they have?

The experience gained elsewhere by observers and engineers, and in the laboratory of this Board, proves that by efficient filtration an inferior can be converted into a first class water. Witness the improvement in the water supply of St. Thomas, Ontario, owing to filtration through Hyatt filters.

In recommending the adoption of the Hyatt filters, I am well aware that to the general public, who may read these remarks, and to some professional men an explanation may be necessary.

It is now recognized that many filters, so far from separating the bacteria may even make the water richer in these organisms. This is due to the fact, that the filtering material, sand, etc., becomes charged with bacteria and not being cleansed gives them up to the water which is offered for filtration. The Hyatt system consists in the addition of a small quantity of alum for each gallon of water before filtration, thus clarifying it considerably by the formation of a precipitate. This precipitate, in falling, entangles and brings down with it the bacteria, so that they are more easily removed by filtration. The filtration takes place through sand contained in large horizontal cylinders, provision being made for the reversal of the stream of water once in 24 hours, so as to thoroughly cleanse the filters.

At page 31, Report of Provincial Board of Health for 1891, we find the following statement: "In St. Thomas there are two of these filters, each with a filtering capacity of 500,000 gallons, and they are at present putting in an additional one." The following are some of the results:

		Bacteria.
July 3rd.	Before filtration.....	45,000 per C. C.
" "	After filtration.....	90 " "
Oct. 23rd.	Before filtration, average.....	1,240 " "
" "	After ".....	44 " "
Pumping at the rate of 1,324,800 gallons per 24 hours.		
" 24th.	Before filtration 10.30 a.m.....	1,240 " "
" "	Water at 10.30 a.m. filtered through No. 1. filter, cleaned at mid-night.....	59 " "
	Water at 10.30 a.m. filtered through No. 2 filter, cleaned at 10 a.m.....	270 " "
	Mixed water at 11 a.m. filtered through both filters.....	65 " "
Pumping at the rate of 810,720 gallons in 24 hours.		
" 26th.	Before filtration.....	1,545 " "
" "	After filtration.....	70 " "
Pumping at the rate of 794,880 gallons in 24 hours.		

The report goes on to say: "These results show a high degree of efficiency in the filters, as in the case of the examination of October 23rd, the pumps were sending water through the filters at a rate about $\frac{1}{4}$ as fast again as their capacity allows for good filtration."

How much better then, would it not be for us to have our water filtered, being thus quite secure and satisfied that no matter what conditions might supervene during the transmission of lake Ontario water while passing through Toronto's sewage laden bay, it would be delivered to the people after filtration in a condition of crystal clearness and absolute purity from pathogenic or saprophytic germs?

In the interests of the public health, however, it is necessary at the present juncture, that an engine be placed on the island sufficient to drive the lake water through the bay pipe, so that the pressure will be outwards and no bay water can be drawn into the supply through defect of the pipes.

It is also earnestly to be hoped, that the members of this Board, and of every Municipal Health Board of the Province will look closely into the condition of the water supply in their respective municipalities. It is quite certain that, excluding town water-

works, many wells through the land are in urgent need of cleansing. As an instance of this, I may mention that, recently, I treated several persons living near the city for severe diarrhœa. An examination of the well water used by them showed that it contained rather more salt than is found in Toronto city water. This salt was not natural to the water, but was most probably derived from some neighboring privies, or else from top dressing used on the land, finding its way into the source of supply. Prevention is better than cure. The services of the analytical chemist should be made use of, and if a potable water supply is found impure, a remedy should be found before the summer is upon us. Where the source of supply is unknown or merits suspicion, the simple precaution of boiling the water before drinking it, should always be used.

As an instance of the difficulty of controlling people in the matter of potable water, I may mention the following incident which has been recently reported from Berlin, Germany: "The report of cholera cases in a workingmen's lodging house, near Trotha on the Saale is confirmed, thus leaving no doubt that Saale water is the source of infection. Five men in the lodging house boasted that they would drink all the Saale water they wished, despite the orders of local authorities to the contrary. On Sunday they drank the water as it came from the river and to-day all five are prostrate with Asiatic cholera of the worst form. In view of their recklessness the Provincial Council has announced, that all persons wantonly disregarding hereafter the local sanitary regulations, especially those as to the use of Saale water, will be punished with imprisonment for a term not shorter than two months and not longer than five years. People in villages along the Saale have been warned, that the water should be used only after boiling.

It is also to be hoped that in every municipality throughout the Province, attention will be paid to the following points:

- (a) A radical and frequent cleansing and disinfecting of all places found to require it.
- (b) A systematic and careful house to house inspection by proper sanitary inspectors, which should be repeated during the summer, at regular and stated intervals.

Should cholera, in spite of maritime quarantine, penetrate into this Province, every municipality should, in addition to the general precautions already mentioned, provide an isolation hospital for the sick, and detention rooms, where those exposed to the disease may be observed for a few days. Next, however, to a thorough bathing of the bodies of immigrants, one of the most important defences against cholera, is a complete disinfection of their baggage and clothing. All articles of clothing or bedding, linen, cottons, woollens, silk, etc., which have been exposed to the poison of the disease, should be disinfected by steam. The recent trials of the McEvoy steam disinfector, which have been made in Toronto show that it is quite sufficient to accomplish the most thorough disinfection in a short time. Cities and towns, therefore, would do well to purchase these magnificent machines, they being just as necessary as isolation hospitals and detention houses. Large ones, such as those which will be used at Grosse Isle, might also be purchased by the Federal Government, and stationed at frontier points, so that articles requiring disinfection could be collected, sent on and returned after disinfection. Circumstances are constantly occurring in different parts of the world, to show that disinfection is done carelessly or not at all. For instance, November the 6th, 1892, Dr. H. Baker, Secretary of the State Board of Health, Michigan, informed Dr. John Kapp, M. H. O., Ann Arbor, that Herman Sager, his wife and four children, immigrants from Bremen on the steamship "Saale," on which a case of small-pox had developed during the voyage, were destined for Ann Arbor. January 27th, 1893, two months after Secretary Baker received notice from Dr. Unterkircher, M. H. O. of Saline, that four persons in the family of Henry Snider, of Pittsfield township, just south of Ann Arbor, were sick with small-pox, and that the disease was brought by Herman Sager and family, who arrived there about two months ago and lived with the Snider family; also, that Herman Sager had a mild case of variola, which was at first taken for chicken pox, as that disease was prevailing at the time. Notice was received of two outbreaks of variola in Ohio caused by immigrants on the same vessel, the "Saale." These three outbreaks came by immigrants through the New York quarantine, and from the length of time before the disease broke out it is certain that the infection must have been conveyed in baggage. It would certainly be in the public interest, if baggage and wearing apparel belonging to immigrants were

thoroughly disinfected by steam at the quarantine stations of this continent, before the owners would be allowed to take passage into the interior.

Now that the Canadian Federal Government is preparing to place large disinfecting plants at the several maritime ports of entry, it is to be hoped, that all immigrants entering this country will be obliged to cleanse their persons, and that their baggage will be so thoroughly steam-disinfected that there may be no reason to fear any evil results from their settlement in this country or their passage through it.

While referring to small-pox, it may be opportune to observe here, that this disease seems to be epidemic at present over a large part of the world. From Japan it was imported into British Columbia, where it is still prevailing. In Great Britain it has made headway. From the United States cases are reported at various localities. Individual cases of this disease will, of course, occasionally occur in the United States, or Canada, owing to the importation of the infection from the west, or the orient; but the neglect of vaccination and re-vaccination will be the principal factors in causing its spread. With small-pox, therefore, all about us, it behooves our Local Boards to see that all are efficiently protected, as it is much easier to keep the enemy out than to fight him once he has gained an entrance.

In making these remarks, I do not intend to belittle the beneficent results of isolation and disinfection. I simply mean to say, that, if vaccination and re-vaccination were universally practiced, small-pox would soon cease to exist, and it would not be necessary to resort to expensive, and often annoying means of defence in order to prevent its epidemic spread in this country.

II. REPORT AND EVIDENCE TAKEN BY COMMITTEE ON SEWERAGE AND WATER SUPPLY *RE* THE POLLUTION OF ACTON CREEK BY TANNERY REFUSE.

Preliminary Report re the Acton Tannery to the Local Board of Acton and the Tannery Owners, by the Secretary.

GENTLEMEN,—Having examined the tannery and the sources of the pollution of the Acton creek running through the several farms below, I desire, as requested, to make the following suggestions as being likely to greatly mitigate, or remove the nuisance caused by pouring the waste water from the tannery into the creek.

1. For systematically dealing with the waste water, it is desirable that its volume, to be treated, be made as small as possible, by turning directly into the creek the waters of the springs, and all other waters which do become contaminated.

2. Convey, as at present, the polluted water to the place where it is to be treated.

3. Have the area, at present used for allowing the grosser materials in the polluted waters to settle, or as much more as may be found necessary, made into a series of flat beds in a manner similar to that carried out in different places.

4. As to the extent of these required for performing the necessary work, it will depend on the volume of refuse water to be treated. But, in the meantime, I would suggest that the present area be first prepared for the reception of the sewage, by converting it into an oblong, flat bed, divided into three sections as in the following diagram.

The sides should be raised at least 18 inches above the level of the flat bed, and be made of planking, with present earth, or if preferred with good clay, so that they will be strong and impervious banks. The ground of each flat-bed should have a series of two-inch (2") tile drains laid at a depth of $2\frac{1}{2}$ feet below the level of the flat bed, and fifteen

N.B.—The peculiar nature and the importance of this subject, and the wide extent to which the evils of such pollution may spread, make it desirable that a knowledge of the facts be as widespread as possible. The evidence taken before the Committee and their conclusions are therefore printed in full. *Secretary.*

feet (15') apart. The ground, which is gravelly, should during the levelling, be all carefully ploughed and subsoiled, so as to be made as porous as possible. On the levelled surface one foot of pure, sharp sand (coarse) or fine gravel will then be hauled. It is of the greatest importance that this filtering material contains no clay.

5. The beds having been thus completed, they will be ready for the treatment of the sewage in the following manner: On flat-bed No. 1 turn the sewage of 24 hours, from the conduit by several gates and small carriers, which will deliver the sewage so as to evenly cover the whole filter-bed. Treat beds No. 2 and No. 3 similarly on the second and third days, returning to No. 1 on the fourth day, and so continuing the rotation. By this means each bed will have an intermittent filtration, and time to cleanse itself before being used again. It will filter the water rapidly downward, and run purified from the tile drains if they are kept above the clay.

6. On the side of the filter-beds towards the hill a deep ditch must be dug, so as to carry all rain and soakage from the hillside away from the fields to the creek direct.

7. Should it be found that the waste water has a notably acid reaction in the conduit, it will increase the rapidity and thoroughness of the purification, if the refuse water, before flowing on to the filter-bed, be carried into a tank where it can be treated with an amount of milk of lime, sufficient to neutralize the acid. A partial sedimentation will take place in the tank, from which the upper water can be allowed to flow to the filter-bed. A pair of tanks to be used alternately would be necessary in this case, since, from time to time the sediment would have to be removed. In the meantime, however, I think it will be found, if the filter-beds be carefully constructed, that they will be equal to the necessities of the case.

I forward you a copy of the annual report of this Board, in which the sewage farm at London Asylum, is reported upon in detail; as also papers bearing on this subject found in the report of the Health Officers' meeting at Owen Sound.

I have made these suggestions unofficially, in order that the matter complained of, by the owners of lands along the creek, may be arranged amicably with owners of the tannery.

Should there be a neglect on the part of the latter to take prompt and early action, the regular steps to be taken for the abatement of the nuisance, would have to be set in motion.

These are indicated in sections 64, 29, etc., of the Public Health Act, Chapter 205, R. S. O.

Of course actions for damages under common law, or an application for an injunction may be taken, but I trust that in a case, where the remedy can be so readily applied as in this, the suggestions I have made will prove sufficient.

I have the honor to be,

Yours truly,

PETER H. BRYCE.

Report of Evidence in the matter of an Outbreak of Anthrax amongst Live Stock in the Township of Esquesing and the Village of Acton, Ont.

The following evidence was taken in the Town Hall, Acton, on Friday, the 22nd of July, 1892, before Dr. E. E. Kitchen (presiding); Dr. J. D. McDonald and Mr. J. J. Mackenzie, representing the Provincial Board of Health of Ontario.

All the witnesses were examined under oath, and a full enquiry was invited by those having the investigation in charge.

Several maps were submitted, showing the course of the stream passing through the tannery premises, and which, it was claimed by some, had been polluted by refuse from the tannery being emptied into it.

Mr. Boyd, barrister, asked and received permission to examine witnesses for Messrs. Beardmore, owners of the tannery.

S. WEBSTER, M.D., sworn : I am Reeve of the Township of Esquesing, and a member of the Local Board of Health. The Township of Esquesing is one of the municipalities of the County of Halton. The Village of Acton is in the Township of Esquesing, geographically, but it is a separate municipality. During the last three or four years there have been complaints made by the farmers in the locality between the Village of Acton, and I may say the Village of Stewartown, in regard to the condition of this stream now under consideration. They state that the water is very black in appearance, and that more or less slime, and greasy substances collect around the bank as the creek courses through the township ; and they claim that the water is unfit to be used for animals or for men.

Dr. KITCHEN : Do cattle drink of it ?

WITNESS : Oh, yes ; all the way down, they do. It is an important stream, and they make use of it, more or less, all the way from the tannery to Stewartown. There is a good fall in some places, although it is flat in others. There was no special action taken in regard to the matter, until last summer, when there was an unfortunate outbreak of disease amongst cattle, supposed to be anthrax. The Local Board of Health of Esquesing investigated the matter, as far as lay in their power, but knowing that the matter was in the hands of the Provincial Board of Health, they left it to that body to take such action as they deemed fit. At that time several farmers lost quite a number of cattle, which was a considerable loss to the agricultural industry. In addition to that, their remaining stock had to be almost isolated, as people were afraid to purchase milk, or butter, or buy the stock. Since that time I have not heard of any further loss from this disease.

Dr. KITCHEN : Do you know anything of the disease personally ?

WITNESS : I have always recognized that it was a dangerous disease, and have given necessary instructions as regards burial with lime, and some, I have had cremated. I prefer cremation. I do not know how many animals have been lost. None have died from anthrax for about a year.

Dr. KITCHEN : Were there any losses prior to that ?

WITNESS : Yes ; but I have no personal knowledge of them. It is claimed by men who have farms in the neighborhood of this tannery creek that their land has depreciated in value, as people are afraid to let their cattle drink of that water, owing to its appearance being against it. I do not know anything personally about it.

Dr. MACDONALD : Do you know when the first of these cases of anthrax appeared ?

WITNESS : I cannot give you any definite information in regard to that. I have lived in this neighborhood about 26 years. I have heard reports during that time, that cattle have died from anthrax above here, and also in the neighborhood of Guelph. I have occasionally heard of a cow dying along the banks of the Credit, but what has been the cause, I do not know for certain. However, there has been nothing in the way of an epidemic, until last summer. I had heard complaints, but never followed them up.

ARCHIBALD MCPHERSON, sworn : I am a farmer, and live on lot 26, 2nd concession of Esquesing. I am situated one lot from the tannery lots. I have been on this lot nine years as tenant, and during that time I have lost a considerable number of stock. I lost two horses, six head of cattle and three sheep, last summer. I never lost any prior to last summer, as I never let my cattle on these flats before that time. One of the horses and two or three head of cattle were dissected, and examined by Dr. Bryce, of the Provincial Board of Health. Part of the creek goes through my farm. I was renting Mr. Allan's farm for two or three years, and the cattle got on the creek. I never lost an animal until then. The man who was on Mr. Allan's farm before me, lost one occasionally for the past six or seven years. He did not say anything about the symptoms of the disease in these animals, but they died suddenly. The first animal I lost was a milch cow. They went off to milk her, and when they found her, she was dead. She appeared to be well in the morning, and was then milked, but she died that afternoon. Another cow died somewhat similarly, and the third animal I lost, was a horse. My boy went up after

the horses in the morning, and came, and said there was something wrong with the horse. I said "Turn him into the stable and leave him there." I went over to Mr. Lawson, the veterinary, and he said it was distemper. I took the horse over, and rubbed his chops with a liniment, and he gagged. The next morning I went to rub him again, and the moment I touched him he dropped. The lad came and said the beast was dying, and when I got in, the beast was dead. Dr. Bryce examined him, and the word he sent me back was, that it was anthrax. There was a swelling of the glands, and some discharge at the nostrils. The animal was not able to drink, or swallow. I did not notice anything else about him. I sent away the mate of that horse to my brother-in-law's, and the night I buried the first one I got word that that one was sick also. I buried the horse about six feet deep, on high land. I was authorized to get lime and put it over the top of them. I burned one of the cows by putting wood on her. The second horse got better. I attribute his recovery to fumigation of sulphur. Last summer was a particularly dry one. The creek floods the flats every spring, but I could not say how much. I did not let any cattle go on last spring, as I was afraid.

Dr. MACDONALD ? Where did the cattle die ?

WITNESS : I found the cows dead in the field. In the case of a two-year old steer, I noticed at night that she was sick, and I shut it in and left it all day, and never gave it a drink or anything. In the evening I offered it some water. It drank a patent pail full, and I got another pail of water, and it drank half of that. I left the pail near it, and next morning I found the animal dead, about three feet from the pail. I had almost forgotten that, a year ago last summer, I lost a steer. Mr. Lawson examined it, but did not know what was the matter. I have been working the same land this summer, but I do not let the cattle run. The horses were running out for only a week, when they died. They jumped over the low fence. They were only three times on the flats before they died. The cattle were on that land from the spring. The order of affection was first two cows, one or two sheep, then the horses, then the cattle. In burying the animals I dragged them along the ground, but after that I did not allow a beast to go there until it was plowed up.

To Mr. BOYD : I have lived here nine years last spring. I lived two miles below that place all my lifetime.

Mr. BOYD : Did you ever hear of a case of death before that ?

WITNESS : No.

Mr. BOYD : You never heard of a similar case happening thirty years ago ?

WITNESS : No ; I was too young then.

Mr. BOYD : Did I understand you to say that the man who had this place before you took it had lost an animal ?

WITNESS : Yes.

Mr. BOYD : What did he do with it ?

WITNESS : He buried it there.

Mr. BOYD : Where were the animals you lost, buried ?

WITNESS : On lot 26.

Mr. BOYD : Where did they die ? On the flats ?

WITNESS : No. 27 is the flats, and they died on 26. I lost one on the flats, but the others died on my land, after I had driven them from the flats. The one that died on the flats I left there ; I did not bury it. I think it is there yet. We opened it there, as soon as I heard that it was dead. We never think of burying an animal here.

Mr. BOYD : Did any of your cattle die that were never on the flats ?

WITNESS : No ; I hadn't any.

Mr. BOYD : Had you any horses, or any other animals ?

WITNESS : Not to my knowledge. I am not sure of it.

Col. Wm. ALLAN, sworn : I am not a farmer, but am owner of lot 27, 3rd concession of Esquensing, the lot through which the creek runs. I have rented the farm. There is no farm tenant on it. I am also agent for other farms affected by this enquiry. Mr. McPherson's, lot 26, the next farm except one ; and Mr. Burns I also represent. I have lived here 33 years. I have personal knowledge of the loss of these cattle ; I have seen them all. The first knowledge I had was, when a cow of my own died about 26 years ago. The animal was buried at the bottom of the hill. She was pasturing on that part of the flats where the lower tannery is ; but that was before the tannery was built. I do not remember any of the symptoms. The cow was well in the night, but dead in the morning. I did not notice any more then until Mr. Hay, another tenant of mine, lost some cattle, five or six years ago. I did not see these animals, however. After that, two cattle of John Flynn's died last summer. A cow belonging to Mr. Stathem, baker, and one belonging to Mr. Lane, insurance agent, also died. Some of the cattle that died in the village, were taken away, but some of the others were buried on the hill just as you go on to the flats. The stream does not overflow as high as that. The cattle came home and died in the stable in the night. The cattle that died 26 years ago died with the same symptoms. I agree with the statement made by Mr. McPherson, the former witness.

Mr. MACKENZIE : Do you remember the character of the pasturage 26 years ago ?

WITNESS : It was very good then.

Mr. MACKENZIE : Did you skin the animals ?

WITNESS : No.

Dr. KITCHEN : What is the general height of the overflow ?

WITNESS : It will go about 10 or 12 feet from the creek ; but sometimes more, especially near those trees. It soon runs off again. I have suspected that some of the deaths which occurred about five or six years ago, resulted from anthrax. We thought that the cows that died 26 years ago had been taken ill from pollution of the creek, but did not know of anthrax.

Mr. BOYD : What is the earliest record of deaths ?

WITNESS : About 33 years ago ; just about the time I came to Acton. I am not certain, for they were not mine.

Mr. BOYD : Do you know what was done with them ?

WITNESS : I do not.

Mr. BOYD : The cattle you lost you buried here ?

WITNESS : Yes.

ROBERT DICK, sworn : I am a farmer, and reside on lot 7, concession 7, Esquensing. I am a member of the Board of Health of the township. Complaints were made to the Board, a year ago last May, regarding the death of live stock. That was the first I knew officially about it. The then clerk of the township, Mr. Murray, said that several farmers had made complaints to him, and we called meetings to consider the matter. These complaints were regarding the pollution of the stream, but did not refer to disease of animals. We did not take any particular action at the first meeting, but after that we were notified of the fact that these cattle and horses had died. This was in the summer, about the latter part of June, or early in July. A committee, of which I was a member, was then appointed to investigate, and also to inspect the tannery. We came up here, and found that they were putting in filters, although the work was not then complete. We had communicated with the Board of Health, before we made that visit—the Provincial Board—and Dr. Bryce, the Secretary, had made a visit. I believe that Messrs. Beardmore themselves were superintending the filtering beds, but I understood that they were working according to the instructions of Dr. Bryce. The clerk had written already to Dr. Bryce, who had replied that he had left instructions about filtering beds, and that we should inspect them. We reported at the following meeting of our Board

that the Messrs. Beardmore had carried out the instructions of Dr. Bryce. Two of our Board came to Acton to consult with the Acton Board of Health, but as we had no quorum we could not take any action, although we were satisfied with the filtering beds at that time, but were afraid that they would not act well in the winter. We did not examine them in the winter.

Dr. KITCHEN : Are you still satisfied with the filtering beds this summer ?

WITNESS : I have no objections to them. I cannot see anything to find fault with. I am as well satisfied with them as I was in December.

MARTIN FLYNN, sworn : I am a farmer, and live on lot 25, 3rd concession of Esquesing. I live on the next lot to Mr. McPherson. This stream does not run where I lived before I came here. I have lost three head of cattle, one sheep and two pigs. I lost them a year ago. The first one I knew nothing about until the morning, when I got up and found her dead. Mr. Mackenzie made cultures from the first and second cows.

Dr. KITCHEN : Where do your cattle pasture ? Near the gulley ?

WITNESS : I am up this way from the stream.

Dr. KITCHEN : Did any of these cattle die or were they buried near where your cattle were ?

WITNESS ; One of them was buried about 100 feet from where my cattle were running. I did not think my cattle got into the flats that spring, nor were they driven through the flats. I did not lose any cattle the year before. My horses had communication with Col. Allan's flats, but they did not take the disease. I had no suspicions whatever of how the cattle died, but I heard it was anthrax. I did not form any opinion regarding the cause of disease, except that they may have smelt it off Mr. McPherson's. My farm is fenced into fields. All my cattle were pastured in one field. The second cow died about a week after the first one. The third one was sick about two days. It was pasturing in the same field, but we sent her away from the others. She died there, and we buried her where she died. We put a load of lime in with her when we buried her. We put her in about seven or eight feet. We skinned the first one and opened her, but did not skin any of the others. There is no possibility of the water getting into our fields when it overflows. The pasture was very bare last summer, and the animals were grazing close. The pigs got out where the first cow was buried, and they died a few days after. The pigs were also given milk from the cow that died. We gave the milk to them once or twice. I have not heard of any other cases during the past seven or eight years. I have heard of some cases dying suddenly, but I did not know of any dying from anthrax. I lived about sixteen miles from Gueph, before I came here. I had these cattle that died, about ten or eleven years. I raised all but two of them.

THOMAS STATHEM, sworn : I am a baker, and live in Acton. I have lived here six years. I lived in Georgetown before I came here. I did not know of this creek when in Georgetown. I had a cow pastured on the flats on Mr. Allan's place last year. She got sick and died. The boy drove her out in the morning, and she came home in the evening, but did not give much milk. My wife kept her in that night. The boy took her out again next morning, but came and told us that she was sick, and could not eat. I got her home, and brought the veterinary to her, but she died. We sent her entrails away for examination. I have often been down to the creek in spring and summer. In the summer time, the flats have been overflowed. The pasture was short last year when the cow died.

W. H. STOREY, sworn : I am owner of a glove factory, and have a small tannery in order to supply myself with leather. My tannery is not on this creek. However, the stream that runs through our tannery finds an outlet into the pond, and from this I suppose, goes out in the stream. Our waste does not go into the pond. In fact we have no waste, except what goes out in the shape of dye liquors, and we do not think there is anything deleterious in it. We dress buckskins and kid skins principally. We import East

India elk skins for manufacturing moccasin stock. These hides are dry when we receive them, and we put them through the ordinary process of turning them into buckskin. They are put into water first and soaked; and when these are soaked sufficiently they are "broke" on a beam. Then we unhair them, and the skins are put on a fence until they are dry like parchment. We next put them into fat liquor, made of oil and certain alkalis, and take them in two or three times, and break up into the fulling stocks, so as to soften them. All buckskins are made in fulling stocks. We do not tan by sweating. Our skins are imported by way of New York, but they are East India skins. Our other skins are raw skins, the product of this country or the United States. We have never had any cases of disease among our work people from handling skins.

MR. BOYD: Do you know of any cases of cattle dying here years ago?

WITNESS: Yes. I understand that cattle died in the same vicinity 35 years ago. Mr. Lawson's cattle died. I remember that an action was brought against Messrs. Sessions, Tobey & Co., who owned a tannery now owned by the Messrs. Beardmore. The plaintiff was Mr. Graham Lawson. It was then alleged that the cattle were poisoned by the waste running into the water. Judgment was given for the defendants.

MR. MACKENZIE: Was anything done by way of analysing the stomachs or examining the symptoms of the animals?

WITNESS: There was evidence put in as to the symptoms, but none relating to the analysis. The farm is immediately below Mr. Burns' farm, lot 25.

JOHN LAWSON, V.S., sworn: I am a practising veterinary surgeon, and reside in Acton. I have been practising here for ten years. The farm referred to by the previous witnesses was my grandfather's farm. I am not now interested in the land along the creek. About six or seven years ago, my attention was called to the condition of some cattle. A cow belonging to Daniel Smith was found dead on the flats, but I did not hold a *post mortem*. I had, however, examined one before that. The condition of the spleen of this animal was very much enlarged, and when lifted up the blood ran from end to end of it. The lymph glands were infiltrated; hæmorrhagic with spots. That was six years ago. The cows, then lost, were grazing on the flats, and could get as high as Col. Allan's place. There has been at least one case every year; and four years ago there were three or four. Last year there were about a dozen. I examined three last summer. The result was very similar to the one I have already described, although in some cases the symptoms were not so well marked as in others. In each of these three cases I sent portions of the animals to the Provincial Board of Health, Toronto, and in every case anthrax was found. I have heard my relatives speak of these cases many years ago, and the impression I have received is that they were similar to the present. My father told me, that his father lost seventeen or eighteen head of cattle in one season. They appeared to be all right in the morning, but in the evening they were dead. He said that his father entered a suit against the tannery men, but was defeated. It cost him \$500.

MR. MACKENZIE: How many miles down the stream was the estate of Mr. G. Lawson, where these cases occurred thirty-three years ago?

WITNESS: About two miles at the outside.

DR. KITCHEN: What is the common origin of anthrax, in your experience and reading?

WITNESS: Contagion. I would not care to express an opinion in this case. It has been proved beyond a doubt that it is contagion, and that these cattle died from anthrax.

MR. BOYD: Did you ever hear your grandfather speak as to what was done with the animals that died?

WITNESS: I did not. But at present I always advise owners to bury any animals that die suddenly. A number of cattle have died in this neighborhood from anthrax; some also died at Limehouse, about three miles from here.

WARREN TOBEY, sworn: I reside at Collingwood, where I am engaged in the tannery business. I once lived in Acton, but left here in 1860. I lived here for four years, and owned one of the tanneries now owned by Messrs. Beardmore—the one nearest the town. I had a suit with Mr. Lawson some time ago as regards cattle dying. He claimed that I poisoned the cattle, by the waste from the tannery getting into the water in the creek. It was not proven that they were poisoned by anything I put in the water. It was said that they were poisoned by eating poisoned weeds on the farm. I do not remember, however, whether there was any evidence to that effect. I was sued for twenty head of cattle valued at \$400. It was claimed that I had killed them, and I said that they would have to prove it. It was claimed that they all died that spring. I never heard of any similar cases occurring.

Dr. KITCHEN: Did you import any hides when you were here?

WITNESS: I imported some from South America. Nearly all I used were South American hides. We used a few local hides. Our plan was to "sweat" the hides, and the refuse was run into the stream. The sweating method then used is just the same as that now practised. Very little lime is used; that is another process. I do not know anything of anthrax from actual experience with cattle. None of my workmen were ever injured from handling hides. I do not know of any other cattle dying, except the ones for which I was sued. I do not think it is a rule for cattle to die near tanneries on account of the tanneries.

ADAM LANG, sworn: I am an insurance agent, and live in Acton. I had a cow that died suddenly last summer. It had been pasturing on the flats. We observed that the animal was sort of dull and was hanging around on the flats. We brought her home in the evening, and she died before morning. I had not a veterinary in to see the cow, and I do not know the cause of death. I buried her in the gulley where Flynn's cattle were buried. I did not put any lime in. It was put in about three feet deep; she was just covered up. After she died she bloated up very large. We did not open her until we got to the place where we were going to bury her, and I think a portion of the liver was taken to be sent to Toronto. I think the veterinary took some of the stomach or liver afterwards, but whether or not it was sent, I cannot say. We drew the cow down with a span of horses. We dragged her on the ground without a stone boat.

GEORGE WILDS, sworn: I am a tanner. I live in Acton, and have been a resident for over thirty years. I have been a tanner for four years. I have fished in the creek, and I caught nineteen speckled trout, and J. O. Speight caught sixteen. That was on the 16th of July. I have not known of any workman in the tannery getting a disease from handling hides.

WALTER BEARDMORE, sworn: I live in Toronto, but I am frequently in Acton. I lived in Acton for nearly a couple of years. I used to come every summer here for several summers. I have heard the evidence of the gentlemen representing the local board of health as regards the filtering basins, and believe it to be correct. We went to Dr. Bryce, and he gave us instructions and drawings, and we tried to carry out his instructions as best we knew. The basins are about 22 feet by 200. They were excavated several feet and filled in. My brother can give more definite evidence in this respect.

Dr. MACDONALD: You know there are regulations against polluting streams and creating nuisances in a neighborhood?

WITNESS: Yes; I know some of them. I know that it is not allowable to throw sawdust into streams. But we are not considered a nuisance, as we were offered exemption from taxation to come back again after the place had been closed for some years.

Mr. MACKENZIE: How long have you been importing foreign hides?

WITNESS: We have carried on the importation of South American hides for years. (The witness then, in a very full and interesting manner, described the process of tanning.)

When the dry hides are soaked in water, the water goes down into the drains and into the filtering beds. All the discharges run into the filter now. If we have to clean the filtering beds, it will be difficult to prevent some of this water getting away. The scrapings from the hides, hair, etc., are sold where possible, or else thrown out. Some of the farmers take away the fleshings and exchange straw for it. I have not known of any farmers taking these fleshings being sick. At Bracebridge the farmers take the fleshings and compete for the use of them. None of their animals have ever suffered. Cattle have died around these flats, but I have never known of the same thing occurring under similar conditions elsewhere. The refuse, from the hides at Bracebridge, goes on the fields but no evil has resulted from the practice. In addition to those already named Mr. Atcheson also had trouble with his cattle dying.

ALFRED O. BEARDMORE, sworn : I have lived in Acton six years and am connected with the tannery. We went over the ground with Dr. Bryce, and he pointed out what he wanted and sent drawings. We excavated it near the dead trees, and laid two rows of tiles on each bed. We first laid boards, and carted the gravel down the hill, and covered it altogether with gravel. The gravel varies from a foot to two feet thick. It must be about two feet in the lower part near the outlet. We threw up the earth as much as possible ; for in throwing the gravel up it does not hold solid. We put on a little gravel. It was the end of the summer before we got it finished. This spring we took up the beds and cleaned out the pipes. The tiles were quite filled up. There was some kind of black stuff in it. The earth had percolated through the joints. I have no personal knowledge of outbreaks of anthrax in this vicinity. The first summer I was here Col. Allan told me about the cattle dying a short time before. We were always sure that we put nothing in the way of poison into the stream. A Mr. Elliott takes away the fleshings. His cattle have not suffered. All the flesh scraped off, the lime and the ashes are all taken away for manure. I have not heard of anthrax occurring in the districts from whence we import our leather. All our washings go into the stream.

Mr. McPHERSON added the following to his former testimony : I took several loads of manure from the tannery about seven or eight years ago, and put it on the high hills for manure for the potatoes. The people would not come to the threshing and eat of these potatoes. It was not used as pasture ground, and was not where Mr. Flynn's cow died. Mr. Elliott lost a cow last fall, but he did not say much about it.

The enquiry then closed.

Report of E. E. Kitchen, M.D., Member of Committee.

To the Members of the Provincial Board of Health :

GENTLEMEN,—As a member of your Committee appointed to visit Acton, and examine into the cause of animals dying along the Acton Creek, in the Township of Esquesing, County of Halton, I beg leave to report that we visited these places on Friday, 22nd of July. We were met at the Acton station by Reeve Dr. Webster, Medical Health Officer Dr. Uran, and other members of the Local Board of Health of the Municipalities of Esquesing and Acton, together with the Messrs. Beardmore Bros., and a number of interested farmers. We first visited the flats and creek, the filter beds and tanneries. We then opened an examination at the town hall, where every facility was given to those who could give any information bearing upon the subject. The examination was conducted under oath, Mr. Boyd, barrister, watching and examining witnesses when he thought necessary for the Messrs. Beardmore.

The following information was gleaned, and which we herewith record for the satisfaction of the Board :—

1. That the waste of Storey's small tannery (chiefly dyes) and the Beardmore Bros. two large tanneries are poured into Acton Creek.

2. That no South American or foreign skins are tanned in the Storey tannery except East India elks.

3. That the one tannery of Beardmores' is devoted to home skins for harness purposes, while the other is used in tanning South American steer hides for sole leather.

4. That the sweating process of tanning is used chiefly in all these tanneries.

5. That the Beardmore tanneries have been in operation nearly forty years, the present proprietors owning one for three years, and the other for twenty-five years.

6. That the waste formerly contained so much color that the banks, stones, etc., in the stream are of a dark color, causing an apparent decoloration of the water.

7. That South American hides were used in these tanneries thirty-five years ago, and tanned, nearly entirely, by the sweating process as now.

8. That cattle have died suddenly that have pastured on the flats for the past thirty-five years.

9. That over thirty years ago Mr. Tobey, the owner of one of the tanneries, was sued by one Graham Lawson for \$400.00, for the death of twenty cattle, thought to be poisoned from waste poured into the stream, and that verdict was given in favor of defendant. (The water was not analysed at this time.)

10. That in the springtime the banks are overflowed on flats as far as ten to twelve feet.

11. That during the summer of 1891 there were eleven cattle, two horses, four sheep and two pigs that died suddenly.

12. That all these cattle pastured on the flats, except those of M. Flynn, which ran on the heights above.

13. That, but few animals were buried six feet deep, or more, or with lime. One was cremated, a few only covered with earth, while the remainder were left exposed after death and unburied. That some of those buried were dragged over the ground by horses to their place of burial. That the greater number were left on the flats, and but a very few buried on the high ground.

14. That all portions of dead cattle which have been examined have been found to contain the anthrax bacilli.

15. That during 1891, three filtering beds, each twenty-two feet by two hundred feet, were built below the lowest tannery, under the advice of Dr. Bryce, through which waste now passes before reaching the stream.

16. That the water now passing down the stream is nearly colorless.

17. That all cases have happened between Acton and Stewarton, a distance of three miles.

18. That speckled trout have been caught in the stream during the past summer.

19. That cattle readily drink this water from the stream.

20. There could be found no case among the workmen affected, nor could any trace be gotten of any workman having been affected in past years.

21. There are no animals pasturing on the flats this season.

22. The shorter the pasturage, the greater are the number of infected cattle.

23. That all the waste does not pass through the present filter beds.

24. That the accumulation of refuse piled between the tanneries is something enormous, and has been accumulating for years.

We have no doubt, but the disease from which these animals have died, is anthrax, and has originated from the introduction of steer hides from South America. These hides being tanned by the sweating method, the bacilli are not destroyed, but pass, with the waste product into the creek, and by the overflow of its banks, are left on the soil.

When pasturage is short, like during last summer, the evil shows itself more than when pasture is plentiful and long.

We would, therefore, recommend that the present filtering basins be placed in first-class condition, by a cleansing out of the tiles and bed, and placing therein pure gravel, instead of the gravel and soil now therein—the tile should have a greater grade than now. This should be done under the direction of some competent person, who would visit daily while the work is being carried on. All the waste should be brought to the beds. These beds, when empty, need to be stirred up.

We would strongly recommend the burning of all waste material, and steps should immediately be taken that all the enormous quantities of refuse which have been accumulating for years about the tanneries be burned this season. We are confident that by care and cleanliness and good filtering basins no trouble need arise from further contamination.

For the destruction of the anthrax bacilli, which is already in the soil, we would recommend that the soil be frequently turned by plow and spade. As the parts overflowed are by no means extensive, this is not so great an expense as would appear at first sight. All doubtful lands should be fenced so that cattle, etc., cannot graze thereon. Wherever it is known that an animal is buried too shallow, and without lime, the grave should be re-opened, and, at least, lime added, if it is not feasible for a deeper burial. All places where an animal has lain exposed without burial, should be cleaned up and buried at good depth with lime, say from six to eight feet.

We cannot close this report without expressing our obligations to the Messrs. Beardmore, Mr. Storey, the farmers and citizens generally for their active assistance in getting all the facts available in this matter.

E. E. KITCHEN.

Report by J. D. Macdonald, Esq., M.D., Hamilton.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—On Friday, the 22nd July, pursuant to advice from Dr. Bryce, Secretary of the Provincial Board of Health, I, with other members of the Committee, proceeded to Acton for the purpose of instituting an enquiry relative to the appearance of anthrax, from which cattle and other animals were said to have died, in the neighborhood of that village. The committee of the Board appointed to take charge of this matter consisted of the Secretary, and Dr. Kitchen, but the former being called away on other business of the Board Dr. Macdonald was called on to take his place at Acton. The enquiry was conducted by Dr. Kitchen, the member appointed by the Board. Witnesses were called and testimony taken under oath. One of the parties interested was represented by Mr. Boyd, his legal adviser. Your committee first made an examination of the region called the “flats,” and of a stream which has its course through it, tracing the stream and traversing the “flats” up to the point where is situated a tannery belonging to the Messrs. Beardmore, called the “lower tannery,” of which tannery complaints have been made as having been the source of the anthrax which lately has been proving destructive to farm stock in that neighborhood, and thereby causing great depreciation of property. At this tannery your committee examined certain filtering beds constructed by the owners of the tanneries, into which beds are run all the liquors constituting the waste after the completion of the process of tanning. These beds have been made in conformity with directions given by the Secretary of this Board, and seem sufficient for the interception of the anthrax bacillus, or at least will be so, as soon as the gravel of which their banks are composed is a little more compacted.

It seems apparent from the evidence obtained by your committee that anthrax has existed in the locality examined for many years, many witnesses testifying to the fatality

of a disease having all the indications of the recent disease complained of, from a very early date, say between thirty and forty years. The evidence of Warren Tobey, who operated this tannery more than thirty years ago, strongly points to the presence of anthrax at the time of his occupation of the place. This party was then sued for the value of twenty head of cattle, of which the destruction seems to have been caused by anthrax. The suit was not successful, the claim being that the animals were poisoned by drinking the water rendered impure by his tannery; and no poison being found in the stomachs to prove the allegations.

The evidence of Col. Allan, too, is in favor of the existence of anthrax twenty-five or twenty-six years ago, he himself having lost a cow at that time, the symptoms affecting which, as related by him, seem to afford unquestionable proof of anthrax. He also testified to the loss of several animals by other people with like symptoms within five or six years past. Col. Allan's first loss occurred before the lower tannery was in operation, another tannery higher up the stream, and now called the "upper tannery," having been only then wrought.

From the evidence of Martin Flynn it appears that anthrax has occurred in animals which have not had access to the "flats," but which grazed about 100 feet from where carcasses had been buried. His cattle were in fenced fields. His pasture was bare and the animals cropped close.

Archibald McPherson, who lost many animals after he sent them to graze on the "flats," testifies to the inattention formerly given to the disposal of the animals which died. Those which died latterly he buried, but of one he says, "one which died on the flats I left there. I did not bury it, I think it is there yet." And again, "We never think of burying an animal here."

From all the testimony obtained by your committee, it would appear that these "flats" have been sown and resown with anthrax for many years, and that, though the disease there is probably originally to be traced to the establishment of tanneries on the stream running through the flat land, yet its continuance seems, in no small degree, due to the careless disposition of the carcasses of animals which have perished.

There is little doubt on my part that the lawsuit of thirty years ago, of Lawson against Tobey ended as it did, not because there was no anthrax in the case, but because there was no means of proving its existence in that locality at that time.

Hamilton, August 4th, 1892.

Respectfully submitted,

J. D. MACDONALD.

Report by P. H. Bryce, M.D., Secretary.

To the Chairman and Members of the Provincial Board of Health:

GENTLEMEN,—As a member of the special committee, appointed to examine into the Acton anthrax outbreak, while concurring in the conclusions arrived at by the other members, I would add that the question as to how far any depreciation of the value of lands below the tanneries exists, owing to the existence of anthrax spores on the pasture lands, would seem to be a question, which does not fall within the province of this Board; but on the other hand, it would appear only just that the owners of the tanneries should give an undertaking that further danger of infection will be removed by the adoption of measures approved of by the Board.

Should this not be strictly carried out, then there would seem to be no alternative for the Board but to advise that proceedings looking to an injunction be undertaken, to prevent the waste waters from the tanneries from being poured into the creek.

All of which is respectfully submitted.

P. H. BRYCE,

III. REPORT *RE* SMALL-POX IN BRITISH COLUMBIA IN 1892.

BY THE SECRETARY.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—The outbreak of small-pox in British Columbia, which, within six weeks, has developed such proportions as to have caused 45 cases in Victoria, 6 in Vancouver, and which has spread to New Westminster, and to Seattle in the United States, has created so serious an alarm as to result in the establishment of a quarantine against Victoria by Vancouver, by New Westminster, and the various other ports on the Sound. The outbreak illustrates two facts: first, the imperfect condition of the municipal authorities at least of Victoria, to deal with outbreaks of pestilential diseases, and second, the fact of the practical absence, on the western, seaboard, of quarantine facilities, the establishment of which lies with the Federal authorities.

It will be remembered by many, that, at the time of the visitation of small-pox in Montreal in 1885, serious dissatisfaction was expressed at the imperfect character of the quarantine on the Atlantic seaboard, and especially of that on the St. Lawrence. This dissatisfaction was accentuated with the introduction, within two months of the opening of navigation in 1886, of small pox, by way of the St. Lawrence, causing in one instance outbreaks in Ontario, Manitoba, Michigan and Illinois. Owing to representations made to the Ottawa authorities from several quarters, new quarantine regulations were passed by an Order-in-Council dated August 7th, 1886, which went into force in 1887. Since that time the Superintendent of Quarantine at Grosse Isle had been successful in preventing any cases of small-pox crossing westward, until the summer of 1891, when in the published Departmental Report for the year, the chief superintendent says, "This very season the Provincial Board of Health of Quebec has traced an outbreak of 140 cases of small-pox, scattered over that Province from Gaspé Peninsula to Sherbrooke, originating from a single case in the city of Quebec; and in the report on that initial case the very grave and significant statement is made, "that it is considered quite possible that this case resulted from the steamship 'Brazilian,' which was at the quarantine station in June with small-pox."

As explanatory of this possibility, the report refers to "our quarantine deficiencies," and states, "for the handling of ordinary isolated cases of disease, on incoming vessels, the quarantine station at Grosse Isle is fairly equipped." "But where a vessel is affected as a whole, the station remains, notwithstanding all my unwearied efforts, as destitute of the universally recognized methods of disinfection and maritime sanitation, as it was sixty years ago. Nay, in at least one respect it is worse off now than formerly. For its small wharf was built years ago, expressly to enable the small class of sailing vessels that then brought emigrants to lie at it. The change to large steamships, as passenger carriers, has rendered this wharf useless, as no modern vessel can come to it."

The report further states: "It (the St. Lawrence station) has no means for the steam disinfection of clothing and effects. It has no appliances for drenching with mercuric chloride solution the infected vessel. It had sulphur furnaces on a fumigating steamer; but that steamer had to be condemned, and has not yet been replaced. She was, therefore, not launched last spring, but has spent the year on the slip at Lévis." Again the report states, "The vaccination regulations were altered in this year's Quarantine Proclamation, by the abandonment of re-vaccination after seven years."

I have introduced these several quotations, both to draw the attention of the public to what Dr. Montizambert, the Superintendent, with twenty-five years' experience, believes to be a dangerous state of affairs, as affecting the public health, and to indicate what is even more urgently required on the Pacific seaboard. Ever since Oriental trade and immigration to the United States began, San Francisco and thence other places have repeatedly been visited with serious epidemics introduced from Asia; and now, with the establishment of a Canadian trade, the same dangers exist, as the present unfortunate outbreak too well illustrates.

The attention of the Department of Agriculture has, more than once been called to this danger; but nothing has been done, beyond what already existed in the nominal station at Esquimault. That the danger is ignored, and the situation misrepresented may, I believe, be fairly deduced from the statement of the Minister, in answer to an enquiry in Parliament, regarding a case of small-pox, on one of the Canadian Pacific railway steamers to the effect, that the vessel was in quarantine at Esquimault, when as a matter of fact, she was, at that instant, and had been for several days, in port at Vancouver, having previously landed her case of small-pox at Esquimault.

The danger to the Pacific Province from the importation of such diseases is, indeed, greater than along the St. Lawrence, as the spread of the outbreak to so many points within six weeks, clearly shows.

Whether the disease has already gone eastward or not, a few days will show, but that it may, so long as the disease exists in British Columbia, experience elsewhere has too frequently shown. The activity of the Vancouver authorities has greatly limited the danger from that city, while the prompt action of the Canadian Pacific railroad authorities, in aiding health officers in the past, gives us much reason to hope that the imported cases will be few; but, with Victoria hotels closed, there has doubtless been an exodus eastward of commercial men, and provincial and municipal authorities to the east of the mountains will, for several months, require to be on the alert, and in constant readiness to deal with any outbreak which may occur.

IV. REPORT, *RE* POLLUTION OF DETROIT RIVER ABOVE AMHERSTBURG, WITH DETROIT GARBAGE.

BY THE SECRETARY.

To the Chairman and Members of the Provincial Board of Health:

GENTLEMEN,—On receipt of a telegram from Amherstburg, I proceeded there on the 21st of July, when on the following day the owners of a scow were indicted for polluting the river by depositing garbage therein.

The prosecution was made under sect. 63 and sect. 4 Schedule A, Cap. 205, R.S.O., and after full evidence was taken the court convicted the owner of the boat, the captain and crew, and levied the full penalty.

The detailed evidence is herewith appended.

The following is a copy of the information and a summary of the evidence:

A.

R. S. C., Chap. 17, Sec 13.

Canada, } The information of Louis Lemay, of the Town of Amherstburg, in the said
Province of Ontario, } County of Essex, Constable and Health Inspector, taken upon oath before me, the
County of Essex. } undersigned Police Magistrate for Amherstburg, in the said Town of Amherstburg,
in the said County, this 20th day of July, in the year 1892, who says that he has just cause to suspect and
believe, and does suspect and believe that Captain Neil McDonald, on board steamer *Labelle*, George
Gabour, Peter Bovan, James Walker, Wm. Cobb, Geo. Giblan, Jas. D. Kennan, James Payne, of the
Township of Anderdon, in the said County of Essex, within the space of one month last past to wit, on
the 18th day of July, 1892, at the Town of Amherstburg, in the County aforesaid, did unlawfully deposit
in the river at or near said Town, a lot of garbage, filth, and animal and vegetable matter, the said deposit
being dangerous to the health of the inhabitants of said Town of Amherstburg, in contravention of the Public
Health Act of Ontario and by-laws governing the Public Health, contrary to the form of the Statute in
such case made and provided.

LOUIS LEMAY,

Taken and sworn before me the day and year and at the place above mentioned.

S. McGEE,
P. M.

N.

DEPOSITIONS OF WITNESSES.

R. S. C., Cap. 174, Sec. 69.

Canada, } The examination of Neil McDonald—James Payne, of Detroit, and John A.
 Province of Ontario, } Auld, Stephen Pettypiece, of Amherstburg, taken on oath this 22nd day of July, in
 County of Essex, } the year 1892, at Amherstburg, in the County of Essex aforesaid, before the under-
 To Wit: } signed S. McGee, Police Magistrate for Amherstburg for and in the said County, in
 the presence and hearing of Neil McDonald, James Payne, Peter Bovan, Jas. Walker and Jas. Kennan,
 who is charged this day before S. McGee for the said defendants above named, at Amherstburg, on the
 18th day of July, 1892, did unlawfully deposit in the river, at or near said town, a lot of garbage, filth and
 animal and vegetable matter, the said deposit being dangerous to the health of the inhabitants of said
 Town of Amherstburg, in contravention of Public Health Act of Ontario, and by-laws governing the Public
 Health, and contrary to the form of the Statute in such case made and provided.

(Signed) LOUIS LEMAY.

This Deponent Capt. Neil McDonald, upon his oath, says as follows: Am captain of steam barge
 Labelle; haul garbage from Detroit City to the river; on Monday night, 18th, brought a cargo of
 garbage down the Canadian Channel to the foot of Fighting Island, where we commenced unloading into
 the river, and distributed all along the river from the foot of Fighting Island to the lake shore, and above
 Bois Blanc island, quit just at head of Bois Blanc Island and went out to lake distributing on the way out
 below the town. My crew are George Gabourg, deck hand, and Giblan, engineer; the four men who
 dump the garbage, James Payne, foreman, James Kennan, James Walker, Peter Bovan, three dumpers;
 William Cobb was not on board on 18th; Payne, Kennan, Walker and Bovan dumped the garbage;
 Gabourg washes the boat off in the mornings and cares for lights; the engineer, Giblan, fires and runs the
 engine. The garbage is unloaded under my direction. I tell them where to dump and where to stop; the
 garbage is a lot of filth.

To Mr. COWAN.—Am pilot or captain of the craft; I never deposited any of it in the river; I only
 control the engine and deck hands; the dumpers are under my charge; I decide where and when to
 dump it off; the men are under my control; Payne has contract to put it off and hire the other men. I
 dumped on Stoney Island side of channel and headed towards Bois Blanc Island east, and above Island and
 came down between Amherstburg and Bois Blanc; dumped at Limekiln crossing on way down before
 reaching Bois Blanc. Gabourg sometimes shoveled but not that night.

Re-examined.

Did not dump from head of Bois Blanc Island to foot of it.

(Signed) N. McDONALD,

V. REPORT OF SECRETARY ON THE CONDITION OF A PUBLIC SCHOOL BUILDING IN WELLAND TOWN.

To the Trustees of Public Schools, Town of Welland:

GENTLEMEN,—Having learned of an outbreak of cerebro-spinal disease in a number of
 children attending one of your schools, I took an early opportunity of visiting the town.

In the company of Mr. Gross, the Chairman, and Mr. McCaw, I visited the school
 complained of and inspected it, and its surroundings.

Regarding the school building, I would say that an examination of the ground under
 the building, shows no excess of moisture. Indeed the joists, when examined, were per-
 fectly sound and free from fungoid growth, always present with excess of dampness.

The foundation walls are of stone, rising one and a half feet above the ground, with
 a number of fresh air inlets. The walls are dry.

The floors are in some rooms fair, in others bad, and the filth, that accumulates in
 the large cracks when the floors are tramped upon, rises up in dust, and creates irritable
 throats and spreads germs of disease if present.

The ventilation of the building is extremely defective, there being none, except what
 is possible by windows. These, though high, are narrow, and cannot be lowered in
 winter time, there being no double windows. Wood stoves in some rooms, at one side
 of the room, must make the heat excessive near them, if the farther part of the room is
 to be kept warm.

With these heating and ventilating defects is associated overcrowding to an exces-
 sive degree. In one room 150 cubic feet, and in none much more than 200 per pupil, are
 possible, with the numbers ordinarily in attendance. Three hundred may be considered a
 minimum allowance, when first-class heating and artificial ventilation are present; but the
 above amounts for young, susceptible children are unpardonable.

As regards surroundings, the grounds are too small for 300 children, while the out-buildings and stables on the rear of lots to the right of the school building are within 25 feet of the building, and consisting as they do, of three or more privies, with several stables and cattle byres, are at the best undesirable neighbors, but being in a filthy state, are positively detrimental to health.

The Board of Health must insist on boxes in the privies, the use of sawdust and regular removal of contents, and the maintaining of stables in such a way, that manure heaps be kept under cover, and not more than one load kept on premises, and that stables have water-tight floors.

As regards permanent remedies for the school, I would say that it is urgent that a better site, and one having large grounds, be selected, where plenty of fresh air and healthy surroundings are possible, and that a building completely cellared, cemented below and drained, be constructed, and that some modern and effective system of heating and ventilation be introduced; overcrowding will thus be avoided, and the air of the building can be maintained in a pure condition.

In case this be not carried out this season, I would advise that the present building have a furnace room placed under it, the whole ground beneath the building grouted with cement, and a good furnace built in for heating the whole building, from which properly constructed air shafts can be led to a chimney, and the air of the rooms be maintained in a good state. Some of the old floors should be cleaned and covered with a second floor.

Yours, etc.,

P. H. BRYCE.

TORONTO, 5th April, 1892.

VI. SUGGESTIONS MADE TO TOWN COUNCIL OF LINDSAY *RE* PROPOSED PUBLIC WATER SUPPLY.

GENTLEMEN,—Having been requested to examine the proposed location and source of the water-works for your town, to be constructed by Messrs. Moffatt, Hodgkins & Clark, of Waterton, I visited Lindsay on 25th inst., and having examined into various matters, would report as follows:

1. That, owing to the contract, so far as complete, having been signed before the plans, source, analysis, etc., were submitted to the Provincial Board, as required by section 30, cap. 205, R. S. O., 1887, it will be well to closely enquire as to how far the contract then signed is legal, and as to whether the contract at present existing, or modified, should be re-signed, the plans having been on the 17th inst. submitted to the Board.

2. That, as the contract deals only with Scugog water, and as various analyses have pointed out a great excess of vegetable matter in solution, the question of the water being made by filters a good water is of prime importance, if that part of the contract referring to water for domestic use is to be of any value.

3. From my observation and experience, I strongly recommend some one of the filters—Hyatt or National—now in the market, or some other arrangement equally good as filters, such as sufficient beds of sand and gravel (to be used in alternate sets so that they may cleanse by rest).

4. The location on the river at Mary street seems to be equally good with any other for taking the water from the stream, as it will be the same water there as a mile up, if new sources of pollution are prevented from contaminating the water above.

5. A pump-house, etc., can with convenience be erected at Mary street.

6. From a knowledge of the strata north of the Oak ridges at different points, and from the general presence of artesian wells wherever borings have been made in Lindsay, I deem it proper to say that I believe borings sunk 75 to 100 feet near the Mary street location will give a good artesian head of ten or twelve feet, while a number of these, if successful, coupled together, would materially assist in giving a pure supply, providing analysis shows the water to be free from disagreeable constituents, which, I am glad to say, is the case with the sample analysed.

As the experiment can be made at the nominal cost of \$100 or so, I would strongly recommend the council to expend money in a proper experiment, both to give better water to the town if possible, and, if not successful, to remove reasonable grounds for complaint, since it would show that the Scugog is the only available supply.

Hoping that these observations may be of use both to the town and to the company.

I have the honor to remain,

Your obedien^t servant,

P. H. BRYCE,

Secretary, Provincial Board of Health.

To the Mayor and Members of the Town Council,

Lindsay, Ont.

VII. REPORT *RE* PETERBOROUGH SEWERAGE SCHEME.

To the Chairman and Members of the Provincial Board of Health :

GENTLEMEN,—Your Committee on Water Supplies and Sewerage Systems beg leave to report that they have had laid before them the plans of a system of sewerage for the Town of Peterborough, prepared by Mr. A. Macdougall, C.E.

After a careful consideration of the plans, with explanations by Mr. Macdougall, your Committee, learning therefrom that the proposition for the present was to discharge the sewage into the Otonabee below the town, thought it well to notify the Local Boards of the townships along the river below, and give them an opportunity for expression of opinion as regards any evil effects upon their property and the lives of their ratepayers.

Communications were received from some of these Boards protesting against the scheme ; so your committee, in order that it might be made better acquainted with the facts, arranged with the several Boards interested to hold a joint meeting at Peterborough on April 16th.

Your committee reached Peterborough on the evening of the 15th, and then met members of the Local Board of Health, the Town Council and members of the Board of Trade. Their various views on the matter were heard, and some of the pressing sanitary needs of the town detailed. On the succeeding morning your committee, with members of the various above bodies, went down the river in a steamer and examined its course and the character of the banks. It is the largest river in the Province, excepting the Ottawa, and discharges many gallons per minute over the dams.

Its waters are kept comparatively even in flow throughout the season owing to their being stored throughout the spring in the numerous lake basins on the river above and its tributaries. At the time of our visit the river was some three feet below flood height, and has not a large amount of drowned land during the upper part of its course below Peterborough. The farms run down to the water's edge, and the houses and barns

are situated on the high ground, usually several hundred yards from the banks of the stream. The river is deep enough for steamboats to run down to Rice lake throughout the summer.

The shores in the neighborhood of the outfall are of a light soil and porous character. There is on the line of the proposed outfall a large, level tract especially well suited to the purposes of a sewage farm, whenever this is demanded.

The town is growing, and has several business streets closely built up; and while the extension of the public water supply has prevented many evils incident to soil pollution, there is urgent need, both in the interests of health and progress of the town, to establish a sewerage system. This is seen in the public nuisance at present existing along the course of the creek flowing through the town, and which is made an open sewer for a large number of private drains from houses, hotels, etc., and especially at one point where the sewage from the large Edison works is conducted to it by a large open box-drain situated under the sidewalk.

After an inspection of the river and town, your committee met with representatives of the various interests, and the chairman, Dr. Macdonald, after stating the objects of the committee, called upon various gentlemen.

The following is a *resumé* of the discussion which took place:

MINUTES OF THE MEETING HELD IN THE TOWN HALL OF PETERBOROUGH, APRIL 16TH, 1892.

The Board's Committee on Sewerage and Water Supply held a session at 3 p.m. in the Council Chamber, Peterborough, to hear evidence regarding the disposal of sewage by the proposed sewerage system of Peterborough.

Dr. Macdonald in the chair.

The CHAIRMAN presented in a few words the Board's duties under the Act, pointing out the intentions of the Act, and the Board, on visiting Peterborough, were endeavoring to obtain evidence with regard to the working of the Act. He pointed out how the river must become of necessity the final outlet for the sewage effluent, and it will be for the Board to consider what methods are best to be carried out in order that this effluent be innocuous.

ALLAN MACDOUGALL, C. E., was then called upon. He said: "The principal consideration was in any system, 'what was to be done with the sewage?' The laying of levels was easy enough, but to bring them together into one system was the difficulty. The question was not to consider whether the disposal was in one municipality or another—so long as the public health was concerned. After consideration, he concluded that the most satisfactory way was to pour it into the river at Lock street, because the ground was level, and this point was more convenient than at Park street. It would be more difficult and expensive going down to the latter. His view was to prepare a system for 30,000 population. This is always advisable. In course of time there will be an increase of population. What are the contents of this sewage? Kitchen waste, closets and bath-tubs, in addition, manufacturing industries. These may become a nuisance—as dyeworks, chemicals, oil refineries, etc. Human waste of itself is not difficult to deal with, probably best by passing it through land, as in England and France. Massachusetts has lately experimented largely, with conclusions that land is ample for purification. Some rivers have natural pollution unfavorable for drinking purposes. The present question is, what is the least amount of pollution? It will not be until 10,000 of the population use sewers that the pollution will be 1 in 540. This river has a good current in a favorable condition, as when we visited it to-day. The banks are sloping, well situated, few flats along the river. Any pollution poured out at the middle of the stream will not, in my opinion, be noticeable within a quarter of a mile from the outfall. The township representatives are naturally anxious regarding pollution; but there is a constant churning of the sewage, and there will be no fear of sewage lodging along the banks, nor any danger to cattle drinking from the river. I state this on my professional reputation. My opinion to the townships, if asked, would be just the same as that I have given to the committee.

MR. CAHILL, Chairman of the Sewerage Committee of Peterborough Council, assumed that the friends of the Townships would not object to Peterborough building sewers, but that they might object to its disposing of the sewage. It is a necessity for the town, and will be an advantage to those surrounding. An expense will be necessary of say \$200,000. In adopting systems, 99 per cent. of towns dispose of sewage in streams—99 per cent. in streams smaller than the Otonabee. We do not expect those below to be hurt. In disposing of this subject we got the best advice possible in Mr. Macdougall. We will be glad to supply all information possible.

MR. DENNISTOWN, of the Board of Health of Peterborough, said: "We are much interested in the proposed sewerage scheme. The town people demand we shall supply such a system—whether the vote will be favorable must be seen after—we now wish to formulate a complete plan. The Provincial Government has wisely provided that such plans be submitted to the Provincial Board, and they must investigate and approve, and they are here to-day to discuss the matter. They have the matter under control; they have power later to require us to remove any real nuisance complained of, and we trust the neighboring muni-

cialities will not be unreasonable in the matter. One point raised by the Warden, viz, that objectionable sewage would float. It was answered that such matter is disintegrated in the long outflow pipe. The people and the Local Board are urging it on the council, and we hope the townships will help us.

Mr. BELCHER said that what has been laid before the Board rendered further remarks unnecessary on his part.

Mr. FOSTER, the Warden, said he thought that it might perhaps be an injury to the people living along the stream—he feared there would be an odor.

Mr. MACDOUGALL explained that a steel pipe will be carried into the penstock on shore and thence into the middle of the stream. He did not think there would be any danger to dairy farms.

Mr. FOSTER asked whether Mr. Macdougall would not prefer taking his milk from a man up stream rather than below the output.

WM. ANDERSON, Reeve of Otonabee, said: "Of course the sewer is a new thing to us, so we opposed it, as we thought it might cause defilement. We thought it might be offensive to people living near by; but as Mr Macdougall has assured us that it will not affect any of us, we shall not oppose it now."

Mr. MONAGHAN, Reeve of South Monaghan, said: "We do not think it will affect us as we are so far away. Some of our ratepayers have since objected that floating matters would come in on their lands. It has been said that this matter would be taken away, but this is not always done. There might be a cause of trouble some day, but in the meantime our township does not wish to oppose the progress of the town, and will not give a factious opposition."

Mr. COLLINS, Secretary of North Monaghan Township, said he understands the present scheme is for all time, and the township wants a safeguard for the future, and referred to the alternative of a sewage farm in the place, which at that time will be built up and so will not be obtainable. There is a present Statute preventing sawdust, and yet they are being asked to allow this scheme to go on. He objects to be left helpless in the matter.

Mr. KENNEDY, of Otonabee, said he thought Peterborough required a system of sewerage, but he objects to the point of disposal, as the river is not a rapid one. The large marshes and bays to be seen in August are not seen to-day. He said at the Yankee Bonnet the current will cause an eddy, and on flats five to six inches of sawdust are deposited. We do not want sewage in addition. He is of opinion that people would object to the butter and milk from this district if other could be got. His farm is within one-half mile of the point of discharge, and has a half-mile of river front farm. The smell from sawdust at present is most disagreeable. He was sure sewage would not lessen this. Along the river are dozens of farms where flooding takes place frequently in the spring; this year not so much so. In low water the river is very sluggish. Deposits will take place, and do take place in high water. On this account he does not want one drop in 40,000.

Mr. COLLINS made an explanation, and asked several questions.

Mr. MACDOUGALL answered the objections, and said that sawdust was deposited owing to its weight when water-soaked; sewage being little else than water, does not deposit on the bottom in the same way. In the Eastern States the chief trouble is due to manufacturing refuse. He could not advise that Peterborough should go on creating a nuisance.

Mr. MELDRUM, Councillor of Peterborough, pointed out that at present the sewage goes into the river. He thinks the extra amount of sewage at the end of ten years will not be perceptibly more contaminated than now. He thinks the town will be prepared then, if trouble arises, to do their duty to neighboring municipalities.

Dr. BRYCE explained the law as it stands, and how redress might be obtained if any nuisance should arise in the future.

Mr. YOUNG, Councillor of Peterborough, asked of Dr. Bryce regarding experience re pollution.

Dr. BRYCE explained at some length the dangers of sewage pollution, and pointed out that the town may expect some day to have to complete their scheme of purification.

Mr. CAHILL took the chair.

Mr. MELDRUM, seconded by Mr. VELLY, moved a vote of thanks to the Committee for their courtesy in listening to the evidence presented.

Dr. MACDONALD responded.

Mr. DENNISTOUN moved a vote of thanks to Mr. Macdougall for preparing the plans and presenting the subject from a professional standpoint in so favorable a light.

Mr. YOUNG seconded the motion.

Mr. MACDOUGALL responded, expressing his appreciation of the kind remarks.

The meeting then adjourned.

From the discussion, it is apparent that the township representatives are keenly alive to their duty in protecting the interests of their municipalities, and that the town is equally desirous of giving due consideration to the township's interests.

After a careful consideration of the various points at issue, which are herewith summed up, your committee have arrived at certain definite conclusions.

The points to be considered are :

1. The fact that the sanitary needs of Peterborough demand at once the construction of a complete system of sewerage works for the greater part of the town, notably the thickly populated.

2. That, owing to the surface configuration, the engineer has shown that a very complete and economical system can be carried out in which practically the whole sewage of the town may be collected into one main sewer.

3. That this, as far as the town goes, may be conducted down Lock street by gravity, there pouring its sewage well below the town into the river.

4. That the route of this main sewer is such as to make it possible, by a very slight elevation of the sewage, owing to the head it gets in the town, to run it on to a level tract of land, there to be purified by intermittent downward filtration. There is no doubt but that the land can be made to pay a good portion of any cost of so treating the sewage, from the crops which can be raised on it.

5. That, inasmuch as the population of the town is at present not more than 10,000, of whom for years not more than 5,000 will have house connections with the sewers, and that as for some time the sewage will consist principally of sink and kitchen sewage, the amount of pollution, as far as bulk goes, will not create at the point of delivery into the river, or below it, any notable nuisance to persons living along its banks.

6. That, if the town increases, the pollution becomes such as to give reason of complaint, the town will then be in a position to deal more readily with any increase of expenditure incident to the disposal of the sewage in some other manner.

7. That, while it may be true that there will be no pollution serious enough to make a nuisance unpleasant to the senses, yet it cannot be forgotten that all water polluted with sewage—even in small quantities—does at times become the vehicle by which contagious diseases are conveyed. Hence, if the Otonabee were to be in the future the source of public supply for any town, it would become imperative that Peterborough dispose of its sewage by filtration or other disinfectant methods. At present, as the well water supply is everywhere abundant on the farms along the river, the river water will not be used for household purposes.

8. That, as the Board is aware, there are, however, dangers attaching to sewage where it overflows flats and deposits on them (as it has presumably done at Guelph and Acton) the spores of a contagious disease fatal to animals, viz., anthrax. In case there be woollen factories, tanneries, etc., at present or in the future in Peterborough, pouring their sewage and waste water into the river, this Board's experience, in at least these two places, places the duty upon it of informing the town of Peterborough that the sewage of these factories, etc., would have to be specially treated before leaving their premises, otherwise the town might at any time come into collision with the other municipalities, while the owners of cattle destroyed would certainly have a right to claim damages for any injury done to cattle in this manner. That this danger is not imaginary is seen in the difficulty which has arisen at Acton, and which is now the subject of a petition of enquiry before the Board.

Your committee, therefore, keeping in mind all these considerations, would say :

1st. That it approves of the plans of the system of separate sewerage prepared for the town of Peterborough by their engineer, Mr. Macdougall.

2nd. That, in view of the initial expense incident to any scheme, your committee deems it desirable that the amount of money required to be raised in the town at first be the smallest compatible with the character of good work.

3rd. That for several years the work will not be so much that of carrying sewage as of house water and cellar drainage ; and hence the pollution of the river will not be large.

4th. That, while the Board approves of the placing of the outfall of the sewage in the river for the present, it does so conditionally, *i.e.*, that whenever pollution is complained of, and can be fairly shown to be productive of results prejudicial to the interests of the townships or of individuals, either in the town or townships, the town must then complete the system as outlined in the report, by arranging for a filtration of the sewage or other method satisfactory to this Board, before pouring the effluent into the river.

5th. That the town must undertake from the beginning the control of those industries—as woollen mills, tanneries, etc.—whose wastes may produce upon cattle, etc., poisonous effects, either in the water or on the lands flooded by it. This precaution seems necessary in order that the town may be free from any action for damages which might be brought by individuals losing cattle pasturing on the flats below.

On the understanding that the proposed plans, as set forth in Mr. Macdougall's report, comprise such as will enable the town of Peterborough to adequately protect existing interests in other municipalities, your committee would recommend the scheme for the approval of the Board.

(Signed)

J. D. MACDONALD,
PETER H. BRYCE,
HARRY E. VAUX,

Committee.

VIII. REPORT ON THE OUTBREAK OF DIPHTHERIA AT AGRICULTURAL COLLEGE, GUELPH.

BY THE SECRETARY.

To the Honorable JOHN DRYDEN,
Minister of Agriculture :

DEAR SIR,—Acting under your instructions I proceeded on March 25th to investigate the outbreak of disease at the Agricultural College, Guelph. I found the following condition of affairs :

(1) That Aggie O'Connor, a servant, the first person in whom diphtheria appeared, took sick and was sent to the hospital December 15th. Prior to her taking ill it appears that two sisters, Susie and Kate James, were sick with sore throat about the beginning of December, Susie about a week before Kate, and Susie had a relapse afterwards. These were, in my opinion, the first cases from which other cases spread amongst the servants ; especially as there is evidence going to show that Aggie O'Connor was exposed to infection in the city, although from having subsequently attended a party some miles away and having come home in the night air she probably caught cold, making her susceptible to the infection.

(2) The second case was a student, C. W. Holmes, who went to the hospital February 9th. This is presumably a case due to new infection, as nearly two months have elapsed since the O'Connor case.

(3) The three next cases were J. M. McCrae, H. Story, Lizzie O'Connor, and were probably exposed to infection originating from the same source, or directly from Holmes, as they took sick together February 17th, the usual period of incubation after exposure to a case.

(4) No further cases occurred until the return of these cases from the hospital, the next being March 12th, in the person of R. Maclean and Pansy Mills, two days later. These were probably due to infection brought back on the persons or on the clothes of the previous sick.

(5) The last were two cases, W. Robertson and W. R. Graham, on March 22nd, ten days after Maclean. This again looks suspiciously like infection from Maclean.

(6) In addition to the above cases, Forsyth, the gardener, took sick March 13th, and Macdonald, who boards near the College, on March 22nd. It will be seen that these belong respectively to the two last outbreaks; exposure to infected persons of convalescent students was quite possible.

(7) Now, whether the cases in the successive series were due to direct infection from the persons of those previously sick or not, it is apparent that infection was present in some form in the College; and the history of diphtheria outbreaks in our public institutions has invariably been the same, that once the infection has been introduced, it is extremely difficult to get rid of it, owing to the air of these buildings being wafted along the corridors and stairways from infected centres to almost every portion of the building. The infection becomes more positive whenever at any portion of the building foul air is present from defective plumbing. The latter seems to keep throats in an irritable and susceptible condition. That the air of the building had become unwholesome, the appearance of a case of typhoid about the middle of March seems to prove conclusively.

(8) In order that my inspection might be of practical value it was necessary that I should assure myself of the condition of the plumbing. Remembering that it was partially old (15 years in the old building) I determined that nothing less than a personal examination of all the plumbing fixtures in the building, and subsequent application of the smoke test, would be sufficient to determine this point.

The Public Works Department having no officer or appliances for doing this work, I obtained the services of Inspector Copping, of the Toronto City Health Department, who, with his appliances, applied the smoke test throughout the whole building. The details of his examination with his recommendations are contained in the attached report. Owing to an urgent telegram to investigate a suspected case of small-pox at Thamesville, I took the afternoon train, and left Mr. Copping to apply the smoke test with the aid of his assistant.

(9) The plumbing shows defective workmanship in some sections, and in other defective principles of construction. The Inspector's recommendations, based upon the results of the smoke test, are almost all urgently demanded. I would make several slight exceptions to them; one being the absolute removal of the closet in the boiler room, it being necessarily in a dark space, and unnecessary as the students' closets are near by. Thus one possible source of danger and expense is removed. It is also desirable that the old cesspool into which some of the central building fixtures still empty be done away with, and that the drain be turned into the common sewer leading to the tank house.

(10) With regard to the latter I have to report that some change in the management is urgently demanded. Pipes have been allowed by attendant to get clogged or frozen, and the sewage was being turned into the creek at the time of my visit. Carelessness in other details of its management was equally manifest. As this attendant is paid, I believe by the Public Works Department, the President of the College assumes no control of him, and as he is not under the daily eye of the other Department he seems to be a law to himself.

I would suggest that the efficient attendant of the closets and wash-rooms be placed in charge of the whole plumbing and sewerage system, a simple matter if he be instructed in his work.

(11) In conclusion, I beg to say that it is advisable that the work of plumbing repairs be undertaken as speedily as possible, and that in whatever way it be carried out, whether by the Public Works Department, or by a local plumber by day work, the work ought not be paid for until after inspection, and the smoke and water test have shown the work to be perfect.

I have the honor to be,

Your obedient servant,

P. H. BRYCE,

Secretary.

IX. REPORT OF CONFERENCE BETWEEN PROVINCIAL AND FEDERAL PUBLIC HEALTH AUTHORITIES *RE* CHOLERA AND VITAL STATISTICS.

A Conference of representatives from the Provincial Governments, officially called by the Minister of Agriculture, was held in the Department of Agriculture, Ottawa, on January 31st, instant, for the purpose of considering :

- (a) The relations between Dominion and Provincial sanitation ; and
- (b) The question of devising a method for collecting and publishing health statistics to be common to the Dominion and the Provinces.

The following representatives of Provinces were present :—Ontario : Hon. Mr. Harcourt ; Hon. Mr. Gibson ; Hon. Mr. Bronson ; Dr. Cassidy, President Provincial Board of Health ; Dr. Bryce, Secretary Provincial Board of Health. Quebec : Hon. L. P. Pelletier ; Dr. E. P. Lachapelle, President Provincial Board of Health ; Dr. E. Pelletier, Secretary Provincial Board of Health. New Brunswick : Hon. James Mitchell. Nova Scotia : no representatives present in answer to the official invitation. Manitoba : Dr. O'Donnell. Prince Edward Island : Hon. Senator Macdonald ; Mr. L. H. Davies, M.P., (Mr. John Yeo and Mr. J. McLean, M.P., were officially accredited as representatives for Prince Edward Island, but were not present). British Columbia : Dr. J. C. Davie, Provincial Health Officer, was officially accredited, but did not arrive in time to be present at the opening of the Conference.

Dr. F. Montizambert, Superintendent of St. Lawrence quarantines, at the request of the Minister of Agriculture, was present.

After the Conference had assembled, Mr. Lowe, the Deputy Minister of Agriculture, stated that he was charged by the Minister of Agriculture to say that he would be present at a later period of the Conference, he having been prevented from being present at the opening.

The Deputy Minister of Agriculture, who temporarily occupied the chair in place of the Minister, in answer to questions from several of the members, informed the Conference of the recent action of the Government in strengthening and furnishing approved appliances at the quarantine stations of the Dominion ; and also of the provisions of the regulations established under the Quarantine Act, and the action of the Department thereunder when cholera threatened last fall. He further, at request, communicated to the members the terms of the Orders-in-Council in relation to Grosse Isle, British Columbia and Halifax quarantines.

It was moved by the Hon. Mr. Gibson, and seconded by the Hon. Mr. Pelletier :

"That a committee consisting of the following named members of the Conference who are present, be appointed to prepare a report to be submitted to this Conference to-morrow morning at 10 o'clock, such report to embody, in brief form, the several duties and responsibilities to be assumed respectively by the Dominion and the Provinces in the matter of taking precautions against and dealing with any threatened invasion of Asiatic cholera :—Ontario, Dr. Cassidy and Dr. Bryce ; Quebec, Dr. Lachapelle and Dr. Pelletier ; New Brunswick, Hon. Mr. Mitchell ; Manitoba, Dr. O'Donnell ; Prince Edward Island, Senator Macdonald."

The resolution was unanimously adopted.

It was moved by Dr. Bryce, and seconded by Dr. O'Donnell :

"That the committee organize, and that Dr. Cassidy be chairman and Dr. Pelletier be secretary."—Carried

The Conference sat from 2 o'clock until 5 p.m., and then adjourned.

DEPARTMENT OF AGRICULTURE,
Ottawa, January 31st, 1893.

The sub-committee met in a room of the Department of Agriculture at 8 o'clock and continued to sit until half-past 12 p.m. The following was unanimously adopted by it :

(1) That the following maritime quarantine stations, namely : Grosse Isle, Halifax, St. John, William's Head, should be equipped with deep water wharves, steam cylinders, tanks for bi-chloride of mercury solution, sulphur dioxide blasts, suitable water supply, hospital and accommodation buildings for the detention of the various classes of passengers, and with such other requirements as pertain to first-class stations ; and that Chatham, New Brunswick, be also equipped with all the appliances necessary for a quarantine station on the Gulf coast.

(2) That in the opinion of the committee it is necessary that provision be made whereby quarantine inspection by properly trained medical officers be established at Rouse's Point, St. Alban's, Niagara Falls, Ontario, McAdam Junction, and such other ports of entry from the United States as may be decided upon as necessary, according to circumstances ; and that such ports of entry be equipped with disinfecting plant, houses of detention and such other appliances as may be necessary for efficiently protecting the country against the invasion of cholera. Further, that at Winnipeg, the entrepot of immigrants east and west, a fully equipped quarantine station be established and maintained.

(3) That in the opinion of the committee, it is urgent, in the public interest, that the supervision of the various quarantines be under the charge of an experienced quarantine officer, appointed by the Federal Government, who shall direct such quarantine measures as the emergency shall demand for the protection of the country, and who shall from time to time inspect such stations with a view to maintaining them in a state of efficiency.

(4) That in the case of vessels coming from foreign ports, they shall report for medical inspection before receiving customs entry. Should infectious diseases have occurred during the voyage, or cases of infectious disease be found on board, the medical officer appointed by the Government shall order the said vessel to report for inspection and disinfection at the nearest quarantine station.

(5) That in the opinion of the committee it is necessary for the safety of Canada that the baggage of every immigrant coming into this country during periods of foreign epidemics be disinfected by the methods already recommended by the committee ; and that such disinfection be performed at a regularly appointed station.

(6) That vessels coming from infected European ports, no cases of infectious diseases having occurred on board during the voyage, should be thoroughly disinfected at a regular quarantine station.

(7) That vessels having had cholera on board during the voyage should be disinfected and detained at quarantine during seven days from date of last case.

(8) That in the opinion of the committee it is necessary, during epidemic periods, that immigrants be followed to their destination. This can be done by the Government insisting that every shipping company shall provide each immigrant while on shipboard with a health ticket in form satisfactory to quarantine and provincial health officers, which shall be a passport of health to the point of destination, and to officers wherever inspection takes place. All municipal health officers should also be notified of any immigrants arriving within their districts by letter or telegram from the quarantine to a provincial or state health officer.

(9) The following do not apply to immigrants who are provided for elsewhere :

(a) When a train arrives at the railroad station and the passengers do not come from a place where disease is epidemic, they will be allowed to proceed.

(b) When passengers are not sick but coming from an infected place, the disinfection will be made of their soiled clothing, and they will be allowed to proceed on condition that they report to the clerk of the municipality to which they are bound. The quarantine officer will notify said clerk and also the Provincial Board of Health.

(c) When there are passengers sick, or apparently sick, from an infectious disease, they will be landed at the infectious disease hospital. Passengers occupying the same car will be detained for 48 hours, and the effects which they brought on the same car will be disinfected. They will then be released on condition that they report to the clerk of the municipality to which they are bound. The quarantine officer will notify said clerk and also the Provincial Board of Health.

(d) Passengers travelling through Canada who are only suspected of having infectious disease will be allowed to proceed to their destination, the quarantine officer notifying the Provincial or State Board of Health to which they are bound.

(e) The cars in which there shall have been sick persons shall be disinfected.

(f) Cars coming from an infected district will have to be provided with latrines containing disinfectants.

10. Should the United States Government adopt a twenty days' quarantine against cholera in 1893, the Federal Government of Canada will enforce the same rule against immigrants who may wish to travel from European ports through Canada to the United States.

(11) When cholera is epidemic abroad, the importation of rags from or collected in infected countries shall be prohibited.

(12) Cars containing merchandise which is susceptible of infection (baggage, wearing apparel, rags, hides, leather, feathers, horsehair, animals remains in general, unbaled wool etc.,) coming from an infected district shall be properly disinfected.

Moved by Dr. Bryce and seconded by Dr. O'Donnell, that the report as read be adopted.—Carried.

DEPARTMENT OF AGRICULTURE,
Ottawa, February 1st, 1893.

TUESDAY, February 1st, 1893.

The Conference met again this day in the Department of Agriculture at 10 o'clock a.m.

The Hon. Mr. Angers, Minister of Agriculture, was present and presided.

The report of the sub-committee was read and passed by the Conference, item by item, and unanimously adopted.

A request was made by members of the Conference that copies of the Orders-in-Council which were communicated by the Deputy Minister at the Conference yesterday should be communicated to the members. The Minister of Agriculture assented.

The question of health statistics next came up for consideration, and after discussion, it was moved by Dr. Bryce and seconded by Dr. O'Donnell:

That in the opinion of this Conference it is desirable that the Federal and Provincial authorities co-operate in the work of collecting, compiling and publishing the vital statistics for the Dominion.

That the cost be divided between the Federal and the several Provincial Governments on some basis similar to the following:—

(i) That the amount paid for registration be an equal charge upon the Federal and any Provincial Government collecting the same.

(ii) That in any case the amount of indemnity paid by the Federal Government for collection of returns by any Provincial Registration Bureau, shall be made upon the basis of the relative number of registrations returned.

(iii) That for obtaining the best results it is desirable that the schedules and forms or collecting returns be as nearly uniform as possible for every province.—Carried.

The Conference sat in the evening at 8 o'clock, after adjournment, for the purpose of meeting Dr. J. G. Davie, the representative from British Columbia, who arrived by an evening train.

The resolutions which had been passed and the report of the committee were communicated to him.

It was moved by Dr. Bryce, and seconded by Dr. O'Donnell :

That in the opinion of the Conference it is urgent that the various provincial health organizations do carry out thoroughly the work of municipal inspection with regard to :

(a) The protection of public water supplies ;

(b) The disposal of garbage systematically ;

(c) The disposal of manure and lane and road refuse ;

(d) The cleansing of polluted creeks, bays, etc., in the various municipalities along the lines of railways and elsewhere ; and that these municipalities be required to supply medical officers, places of detention, and disinfecting appliances as may be necessary to take charge of any cases of cholera which might occur within provincial jurisdiction.—Carried.

It was moved by Dr. Cassidy and seconded by Dr. Pelletier :

That the Conference urge upon those Provinces having no Provincial Boards of Health or other health organization, that their Legislatures do take early action toward passing legislation to this end, both for their own protection and that of neighboring Provinces.—Carried.

It was moved by Dr. Cassidy and seconded by Dr. Pelletier :

That the report of the sub-committee be amended by adding to it the resolutions passed containing further recommendations.—Carried.

It was moved by Dr. Bryce and seconded by Dr. Cassidy :

That a copy of the report of the proceedings of the Conference be furnished to each of its members, and also to the several Provincial Governments represented.—Carried.

The Conference then dissolved.

Certified correct copy,

J. LOWE,
Deputy Minister of Agriculture.

(Copy of letter of representative of the Province of British Columbia, containing expression of his views desired to be conveyed to members of Conference.

OTTAWA, February 2nd, 1893.

SIR,—On the 24th January last I received a communication from the Provincial Secretary of British Columbia, Col. James Baker, requesting me to be present at a Conference to be held at Ottawa on the 31st January, the Conference to consist of representatives from the several provinces of the Dominion, to consider matters pertaining to *Maritime and Provincial Sanitation*. I accordingly left on the evening of the 25th and arrived on the evening of the 1st February, unfortunately too late to take part in the discussion which had been held. Through the kindness, however, of yourself and others I was accorded the privilege of meeting the majority of the members of that Conference, at which meeting the result of the Conference was put before me in the shape of a number of resolutions which had been adopted and recommended to the Dominion Government, on the subject of *Maritime Sanitation*. These resolutions relate solely, *so far as I can see*, to maritime sanitation, and with them I am in full accord. I will particularly emphasize the advisability of carrying out section 8 of these resolutions relating to the appointment, by the Federal Government, of *some medical man* well skilled in quarantine matters, to have supervision over the whole of the quarantine stations of the Dominion of Canada. Such officer I believe you already

possess in the person of Dr. Montizambert. I conceive that the interests of the Dominion in this matter could not be better conserved than by his appointment as Superintendent of the whole of your quarantine stations.

The Conference, however, stopped short when they formulated their recommendations concerning *Maritime Sanitation*, whereas they were distinctly asked to advise on Provincial Sanitation as well as the relations between the two. I made some remarks on this subject, drawing the attention of the Conference to the omission, the result being that Dr. Bryce formulated a resolution which was placed before the members of the Conference present and carried. I would prefer, however, to place my own views on this subject before your Department.

Two lines of defence should be adopted in preventing the importation of cholera in the Dominion of Canada. The first line of defence is what is generally understood as Quarantine Regulations. The experience of the world has proved that this line of defence can never be relied on exclusively. It is bound to have its weak points and loopholes through which disease of a contagious nature can gain access into a locality. While I recommended the enforcement of strict Quarantine Regulations in the Dominion of Canada, under the present circumstances I think that the second line of defence is equally or more important. This second line of defence consists in general terms of the internal preparation of the Dominion of Canada to cope with the disease of cholera if it should gain access to her shores. There are three points which constitute this second line of defence: first, that each city or town or municipality, as the case may be, should be placed, through the agency of its Health Officer or Local Board of Health, in as good a sanitary condition as possible; secondly, that the water supply of each town or city, etc., should be scrutinized with the utmost care regarding its purity and absence of any possible contamination; and thirdly, that every town having a population of over one, two or three thousand inhabitants should establish an isolation hospital.

In my opinion it would be well that these recommendations should have the authority and weight which would be conferred on them by emanating from the Conference which has been held.

The result of the suggestions which I make would be this: Supposing cases of cholera should be brought to the shores of North America in any number, it is almost a foregone conclusion that some cases of the disease would elude the vigilance of the quarantine and you would have these cases developing in one or more of the cities or towns of the Dominion. If any such case or cases should occur in a town in good sanitary condition, having a pure water supply, with the addition of an isolation hospital for the immediate removal and isolation and treatment of the case or cases, the community need have no fear whatever of the spread of the disease or of its becoming in any way epidemic.

I have also to notice that a resolution was offered, during my presence at the Conference on the evening of the 1st instant, recommending the various Provinces to appoint Provincial Boards of Health to deal with sanitary matters within each Province. At the same time, as I have mentioned before, the Conference has recommended the appointment of an *individual* to fill the higher position of general Dominion Quarantine Officer, and I agree with them in this recommendation, as I have before stated. I am of opinion, however, that what is right and proper and best as regards the position of Dominion Quarantine Officer is also best as regards the provincial health authority. In a word, that an individual with proper authority fills such a position better than a body of persons who are more or less irresponsible and unpaid for the work which they do. An army is better under the command of one general than it would be under that of half a dozen.

The Conference, by recommending, in one instance, vesting the authority in the individual, and in the other in a board of health, to a certain extent contradicted themselves.

I have, etc.,

JNO. C. DAVIE, M. D.,

Provincial Health Officer of British Columbia.

JOHN LOWE, ESQ.,

Deputy Minister of Agriculture,

Ottawa.

X. REPORT ON POLLUTION OF STREAMS.*

BY THE SECRETARY.

Mr. President, and Gentlemen of the Conference.—In discussing the subject assigned to me, I do not propose to enter upon an historic account either of the views that have been held, or of the attempts which have been made to solve the problem. I shall therefore endeavor to deal with its practical aspects which we as Executive Officers of Health, are naturally expected to be specially interested in.

Much has been written on the subject with a view to laying down general principles, intended to apply to the question of river pollution in all localities and under all conditions. I believe I am expressing the views of most here when I say that owing to this, probably more than to any other cause, we find ourselves to day met with statements and counter-statements as to the evil effects of such pollution, which have proved most detrimental to the advancement of public knowledge and municipal improvement in methods of sewage disposal.

There exist, however, other and most serious obstacles which have obstructed the progress of the question. Some of these are :—

(1) Individual selfishness and municipal parsimony in dealing with the questions of public water supply and disposal of sewage.

(2) The various standpoints from which the subject is approached such as :—
(a) that of the engineer ; (b) that of the health officer ; (c) that of the chemist ; (d) and that of the biologist.

The engineer seeks for the best point or points for an outfall toward which his sewer mains shall converge, and afford him proper levels in his laterals ; the health officer very properly is concerned in seeing that this outfall shall be so located, as to at least prevent a local nuisance or injurious effects to the residents of his own municipality ; the chemist thinks, if a river water is no worse in organic constituents than many natural waters, that it is fairly safe, while the biologist is inclined to settle the purity of a stream off-hand by the number of living bacterial forms he finds present.

While difficulties such as those just pointed out may be said to attach to the consideration of any question, yet they have assumed special prominence in the subject of our discussion, since to each belong some one or more important elements in the formation of any comprehensive or correct conclusion. For instance if, in a swift-flowing river, sewage is deposited in the middle of the channel, the coarse materials having been retained in a pen-stock, and should water be taken from the river some miles down the stream, it may in some instances have been found possible to not only create no local nuisance, but to show no notable evidence of sewage contamination to the water supply below. Again, the chemist if he has in the above instance found the water below such an outfall improve with distance, asserts with much confidence that the sewage by sedimentation, oxidation, etc., has disappeared, and that the river water maintains its potable character. Similarly in the same instance, if trade refuse added to the sewage has served to prevent some of the bacterial forms, peculiar to a river water from being more abundant below than above such a sewage outfall, the biologist might similarly be slow to condemn such a river water for drinking purposes.

But if we view the question from, as far as possible, the totality of conditions which enter into it we are not long in seeing that in the very nature of things, no conclusion based on the several tests, as applied in the above case, is admissible ; since in all surface waters, but especially in streams, there is an almost daily variation in their local conditions, dependent upon drought, or rains and floods on their branches and higher reaches. These are local rains washing into the streams surface refuse recently accumulated and of dangerous character, or the dissemination from old sources of pollution, as sewers, recent materials having in them specific poisons, which may develop in any river or stream, and may suddenly give to previously inoffensive waters most fatal qualities. If engineers,

* Read before International Conference of State Boards of Health at Lansing, on June 6th, 1892.

chemists and bacteriologists were engaged daily with their various indicators in measuring changes of quality, and were they supplied with efficient means for correcting defects, then we might fairly conclude that with such regulators a river water supply would be safe. Such an ideal state has, however, not been reached; and as executive officers we are bound to enquire more specifically into the matter, and to determine what attitude with our present attainments, we as sanitarians can best assume, and in what direction we must direct our energies.

1. *Evidences of Pollution Based upon Statistics of Disease.*—So general seems to be the opinion that cholera in its native haunts is conveyed by river water, and so universal the evidence of malaria being borne along in river waters from lagoons and shallow banks where organic vegetable matter accumulates and decomposes, that I shall not deal further with them. The case which interests most of us, and which may be said to be the crucial test of water pollution in temperate climates, is that of the dissemination of typhoid fever.

I do not propose to take up time in discussing the statistics of typhoid in all those cities north of the Ohio, situated on rivers below sewage outfalls, and strike an average, and thus settle the question for or against sewage pollution of river water from the evidence of an increase of typhoid deaths, (though I am certain a strong argument could thus be built up and probably will be by others on this discussion); but I shall take what seems to me a more difficult case as a test, viz., evidence from statistics that pollution of immense bodies of cold lake water, and of several river waters in cold weather is not only possible, but also that it does take place.

These diagrams (seen in chapter II part I) illustrate the first point, viz., that bays of great lake water, in itself the type of pure water both from the chemical, biological and experimental standpoint, are not only capable of becoming polluted, but in the instances given are also actually polluted to the point of being *comparatively* measured by death-rates great in comparison with those of cities supplied with the same waters but from points where at present contamination cannot take place.

The following are illustrative of the second point:—

(a) The Provincial Asylum for Insane at Kingston, Ontario, is supplied with water from a pipe laid into a bay of Lake Ontario at a point where a creek brings down vegetable matter.

The superintendent who for years has had the same experience, except that in recent years the use of a Hyatt filter has lessened the outbreaks somewhat, yearly expects that toward the end of January a fever will break out amongst the inmates, which for lack of a better he calls vegetable typhoid.

(b) During the autumn of 1887 the Ottawa river, a river only second to the St. Lawrence in size, and having its head waters on the water-shed to the south of Hudson Bay, was the occasion of disseminating a fever, commonly considered typhoid, in November, which in six weeks had caused 1,500 cases, or had affected one-fifth of the total population between the susceptible ages of fifteen and thirty years.

(c) An outbreak, known as the Plymouth outbreak, occurred in Pennsylvania in March, 1888, the particulars of which are known to all.

(d) A curious outbreak, whose details have been given by Dr. Vaughan, who made biological experiments with the water, took place at Sault Ste. Marie, on the United States side, during the summer of 1890, although the waters of this, as the other great lakes, seldom rises, except along the shores, to a temperature above 45° to 50° Fah., even in late summer. As a presumed cause of this outbreak, a number of vessels had been temporarily, delayed for a week or so, anchored near the town intake pipe in Lake Superior, owing to a break in the canal.

I do not deem it necessary to enter into local details, but need only say that in every case, as Chicago, Cleveland, Toronto, etc., the intake pipe is in water fifty feet deep at least, hence in very cold water, and while, in at least the Toronto instance, the pollution may have been taken in through leaks in the pipe in the bottom of the bay, we have positive evidence from comparative statistics that, no matter how great dilution may be, if sewage can, by winds or currents, reach the intake pipe, it will show its presence in the death-rate of typhoid if germs exist in such sewage.

The following, I believe, will be found to be a law, viz.: "*That, taking a series of years, the pollution of even relatively immense bodies of lake water which, having no regular flow, are liable to carry sewage to a water intake, will, at certain seasons, and with winds moving sewage towards the point of supply, cause outbreaks of typhoid of a more or less epidemic character.*" I further believe that we can establish from the above-mentioned diagrams another law, viz.: "*That in cities obtaining practically all their drinking-water from a public supply, whose source is beyond the possibility of contamination, typhoid fever will practically disappear from the list of causes of mortality.*"

2. *Causes and Conditions of Pollution of Streams.*—What I have just stated as being what I believe will prove two laws regarding pollution of streams applies, of course, to the great source which, as sanitarians, we are so directly interested in, viz., sewage.

But there are several other causes or sources which play an important part in this pollution, and which vary notably both as regards different streams and at different points in the course of the same streams. Referring to the first, it is manifest that a mountain stream issuing from the foot of some glacier, or as a spring flowing as underground water from clefts in the rock, or appearing on the hill-side from some water bearing sand on the top of impermeable clay, and flowing thence in channels cut through rocky beds or layers of clay, will not bear down either in suspension or solution any notable amount of vegetable organic matter. As, however, these or other streams speed on their courses to the plain they not only keep constantly receiving soakage from swamps and forest vegetable detritus, but they are constantly washing, in some districts, alluvium from their banks, and where they pass through cultivated regions tend to receive more and more the surface washings from manured fields, barn-yards, etc., and direct pollution from cattle and other animals which have access to them. Owing to the constantly changing character of the bed along many streams it is, however, common experience that the waters of such show at different points varying amounts of vegetable pollution. We are aware, for instance, how the moorland water of the highlands of Scotland, the lake district of England, the Adirondack and Laurentian regions of the United States and Canada, have always presented, in analysis, an amount of vegetable pollution enormously greater than is often found in other rivers, which are looked upon with suspicion as sources of public water supplies.

Take for comparison an analysis of the water of the great lakes or in the St. Lawrence, and of the Ottawa, whose different waters flow along side each other, the blue of the one distinguishing it for miles from the reddish hue of the other.

Analysis of water in Lake St. Louis.* This lake receives both rivers, but the waters do not mix for miles.

	Total solids.	Loss on ignition.	Albuminoid ammonia.	Free ammonia.	Chlorine.	Oxygen in 4 hrs.	Oxygen in 15 min.
Lake St. Louis—Ottawa River Water....	72	32	0.238	0.030	1.00	5.688	3.128
Lake St. Louis—St. Lawrence River Water	128	48	0.130	0.014	3.50	1.280	0.628

Manifestly, therefore, other very different elements enter into the problem than that of excess of vegetable organic matter. Speaking generally from the sanitary standpoint those streams possessing frequently excessive amounts of vegetable organic matter of a humic character have come to be recognized as in themselves wholesome, and to be placed in northern latitudes in a very different category from many other streams, showing much less impurity of this kind. As illustrations I give the analysis of three different waters. The first is from an inland river, taken from under the ice in February, the river flowing from a lake of considerable extent, with swamp along its borders.

* By A. McGill, B.A., Chemist, Department of Inland Revenue, Ottawa, Ontario.

Analysis of Scugog Water Above Lindsay.

	In parts per million.
Free ammonia	0.72
Albuminoid ammonia	0.38
Chlorine	6.00

The second is from an artesian boring through blue clay to a water-bearing sand above Hamilton shale. It is used as a public water supply.

	In parts per million.
Free ammonia	0.40
Albuminoid ammonia	0.08
Chlorine	202.0

The third is Chicago public water supply after a week of south-westerly winds, the river being two feet higher than the lake.

	In parts per million.
Free ammonia	0.011
Albuminoid ammonia	0.088
Chlorine	1.888

The analyst of the latter water states that the water supply is taken from a point two miles from the shore line. The albuminoid ammonia in water taken from the crib seems no greater than in water taken several miles further out.

Such waters, however, frequently present different characteristics, quite apart from the question of sewage contamination dependent upon the amount and nature of the inorganic sediment which they contain. As this varies from arenaceous to cretaceous or to argillaceous we find very different degrees of precipitation of this vegetable organic matter—clay precipitating with comparatively great slowness.

The well known differences are illustrated in the enormous settling basins which cities using such waters as the Missouri require, if the water is to be freed from its inorganic materials; or in the aid to sedimentation now made use of by water companies using artificial filters. But these river waters having high amounts of vegetable matters possess therein elements which, while harmless in themselves, may become the condition whereby most extended outbreaks of fever may result. Deposited in lagoons they are, with the retreating water, subject to decomposition in the summer, and being borne down by the next freshet, may become the occasion of malaria and dysentery of the most serious character. But what is yet more common in our northern cities is that at some point or other in their course these rivers receive specific typhoid contamination from sewage. I have in mind such a case as that of the Ottawa in 1887. A water-race had been blasted from the rock for about half a mile along the river bank to obtain power to drive the engines. Along the bottom of this race was laid a large wooden conduit into the river above. During the investigation into the outbreak the committee, learning of the suddenness and general dissemination of the fever throughout the city, at once concluded the outbreak was due to water poisoning.

The engineers and many local medical men laughed at the idea of the majestic Ottawa carrying typhoid. When, however, the conduit was examined the next year the following condition, as stated in the engineer's report, was found :—

“I had it examined by a diver, who reported a large number of small holes in the pipe, and he cut out two small pieces of the wooden staves, which showed that they had been eaten or worn away from some cause which I could not then determine. In order to be doubly sure I employed another diver, and he reported the pipe in a very bad state throughout its entire length. He took out more pieces of staves which were even in a worse state than the first. I then had the inlet to clear water tightly closed, and found that the pumps ran for over one hour without any perceptible change in the gauge level, thereby clearly showing that the water pumped into the city was drawn direct from the the aqueduct, and not, as intended, from the inlet of clear water pipe.”

The Lowell and Lawrence outbreak in Massachusetts in 1890 is a similar instance, although the pollution, especially of the Lawrence water, had for years given these towns an unenviable notoriety in the matter of typhoid prevalence. The following extract from the annual report of the Massachusetts State Board of Health for 1890 well illustrates this point of the results of sewage pollution :—

"These are the only two cities in the State which draw their water for drinking purposes from a river, into which, within twenty miles above, sewage is publicly discharged."

"The amount of sewage that has directly entered the river and its branches during the chemical examinations of the past three years is estimated to be about one gallon in six hundred of the river water passing Lawrence, and there has been no more impurity in the water that could be detected by chemical analysis than in about one-half of the drinking water supplies of the State obtained from ponds and streams; but the facts which have been presented showing that these two cities have so much higher death-rates from typhoid fever than any other cities of the State, together with what is known of the relation of typhoid fever to sewage-polluted drinking water, are the strongest grounds for concluding that, even with the smallest amount of organic impurity in the water, as shown by chemical analysis, the disease germs of this disease are able to pass and do pass from one city to the other in the waters of this river."

The details of an outbreak in the cities along the valley of the Tees, in Yorkshire, England, which occurred in August and September, in 1890, are so admirably set forth in the report for 1891 of the Local Government Board of Great Britain that I cannot forbear referring to them.

The outbreak began in August, 1890, a great increase in the typhoid cases for the fortnight ending September 20th being noticed, which increase continued till October 4th. In four weeks 570 cases occurred in 350 houses. In all the area, made up of some thirteen registration districts, there was a total population of 520,000, nearly of all of whom were supplied with water, passed to subsidence tanks, thence through sand filter beds, from the Tees. It was supplied by two water companies, their intakes being but a few score yards apart, at a point two miles above Darlington at Broken Scaur. The amount of water daily pumped was about 11,000,000 gallons.

During the four weeks the exceptional prevalence was limited to the areas so supplied, 41,000 houses being supplied by the companies, 6,000 were supplied from other sources. The rate of excess was calculated by the house—there being twelve cases per 1,000 in those supplied by the city, and less than one per 1,000 in houses supplied from other sources.

What was remarkable was that several hamlets along the river above getting water out of the river, but not from the water company, escaped.

Above the source of supply, the drainage area of the river covers three hundred square miles and the water flowing past the pumping station in times of drought amounts to 45,000,000 gallons. Over this drainage area are scattered 15,000 persons in numerous villages and farm houses. Some fifteen to twenty villages up to Barnard Castle are situated along the river. The nearest is half a mile above the intake pipe, 33 houses whose drainage runs into an old cess-pool with an overwash during rains into the river. The next town is two and a-half miles up the river with sixty houses; and the next six miles up with 170 houses.

The sewage from the last has its watery portion flowing over into the river, the rest drying alongside of a ditch which is washed out with floods.

The next town is seven miles up, and the next is ten miles with 300 houses polluting a branch of the Tees. At fifteen miles above is a town of 1,000 houses.

The heaviest rainfall in the valley during the period occurred in the fortnight ending August 23rd. The river was in flood on the 13th, also on the 23rd.

The rainfall of the 23rd is exactly parallel with the incubation period of typhoid, which preceded this general diffusion. The town authorities have for years recognized the liability of the river to severe pollution, which occurs during flood time. In 1887 analyses were made biologically and chemically, the report of which states "That on a sudden rise of the river's flow, and for 48 hours after its onset, there is a great increase of organic matter at the pumping station—and abundant evidence of unaltered sewage."

"The filtering processes greatly reduce the amount of organic matter, but during high water the town water shows presence of organic pollution, which is in part composed of fresh sewage unaltered."

None of the towns above suffered from any epidemic of typhoid during this period, although several isolated cases had appeared.

Dr. Barry concludes his report with the following conclusion :

"That if the sewage and excremental and other refuse were kept out of the river, the danger of specific pollution would be greatly reduced, but even under these circumstances it is still doubtful whether a water pumped from a river at a point upwards of forty miles from its source is anywhere in this country a desirable supply for drinking purposes.

From these and hundreds of other outbreaks which have been more or less closely studied, it must be apparent that the soundness of what I have laid down as a law of pollution can scarcely be questioned.

At this point we are, however, met with the sceptical enquiry, how, if what is here stated be true, does it happen that our towns are not decimated by constantly recurring outbreaks of typhoid? I shall therefore endeavor to set forth what appear to me to be the chief reasons.

3. *Why Polluted Streams Fail to Produce at all Times Outbreaks of Typhoid.*—Notwithstanding all that theory would lead us to infer with regard to the causes which lead to outbreaks of typhoid, it may be here said with perfect truth that there have been and are many local conditions, which viewed generally seem so bad as to inevitably cause outbreaks of typhoid, and yet which have failed so to do. Believing as I do, and as I believe most here do, in the production of the disease, only by some one or more specific species of microbe, it becomes incumbent upon us to endeavor to supply some rational explanation of these cases of local temporary or continued immunity from outbreaks of typhoid. I shall endeavor to give what appear to me to be some of the reasons therefor in their natural order.

1. The temporary absence in the polluting sewage of some towns of the specific microbes from pre-existent cases. This may fairly be assumed from the facts, frequently published that when the excreta from cases have been known to obtain entrance into wells, into small streams, etc., they have seemed to be the occasion of outbreaks where with the same polluting conditions few or no cases had previously appeared.

2. The much more frequent case, where, although such microbes do reach streams supplying public water, the natural agencies inimical to their multiplication have preponderated. What they are is but partially known. By bacteriologists we are assured that water-bacteria are hostile to the development of typhoid germs; from others we learn from their experiments, that while the diphtheria bacillus is not soon affected by sunlight, yet the typhoid bacillus soon disappears if exposed in liquids to sunlight.

3. Another, and I believe, a most potent cause for their non-multiplication is temperature; and in this way that with a warm temperature water-bacteria are present in streams in incredible numbers, and do then very probably prevent the development of typhoid bacteria, aided by the presence of sunlight.

That there are temperature conditions, however, most favorable to the development of typhoid bacilli seems to me to be proved beyond all doubt by the history of what we often term *typhoid* wells. Probably every one of us is acquainted with one or more such wells which, as the latter summer months come around, cause local outbreaks of typhoid. In the north these are almost invariably shallow wells fifteen to twenty-five feet deep or less. In such the normal water-temperature of say 51° F. slowly increases, the depth of water and therewith the dilution of the filth in the well becomes less; and the annual outbreak of typhoid occurs. Here are increased pollution, increase of temperature and absence of light, the necessary elements for the development of the germs of the disease which have lain dormant in the well. In streams, such conditions do not exist together with anything like the same frequency; and hence it is that in warm seasons it seems principally when floods bear down an increased pollution, or when drought by evaporation produces much the same conditions that river typhoid develops most freely.

4. To these conditions Pettenkofer and others with him, adds a most important agency in the abounding vegetable life of streams, which according to this author continue their purifying effects on the waters of German rivers even in winter. For two reasons this same infusorial life in the cold rivers and lakes (except small lakes and ponds) of the north does not in winter seem to carry on its beneficent work, as seen from the facts first, that in our frozen rivers the vegetable organic materials present in solution are at times in excess, and sewage will flow unaltered for many miles under the ice, and second, because as seen in most notable instances as in the Ottawa outbreak, as also a most serious outbreak at Sarnia on the St. Clair River, and at Plymouth, Penn., river epidemics of typhoid have occurred from the river water at winter temperatures.

5. Another and most potent element in the prevention of outbreaks is constantly more or less in operation, viz., sedimentation. Polluted swift flowing streams may really be more dangerous than sluggish ones. Buffalo sewage is readily detected in the Niagara River at the Falls, and the river water at Fort Niagara at the mouth of the river shows some evidences of its presence. In so cold a stream decomposition by natural processes must of necessity as in winter be delayed and sedimentation cannot well take place, enormous dilution being the special element of safety in this case.

In sluggish streams with detritus from the banks of creeks and rivers, sedimentation in such waters is enormous; but when in winter this does not greatly take place the sewage may, with whatever germs it contains, be carried along to a public water supply unaltered, and being drunk with the water produce, as in instances cited, epidemic effects.

6. Another accidental element in the prevention of outbreaks is that of currents. Currents in streams as in lakes, although perfectly understood by fishermen and every amateur yachtsman and harbor-master, are to the engineer and scientist enigmas as difficult to understand, as is the historic flea to catch. As popularly stated, "you put your hand on it and it isn't there." This has been elaborately illustrated by the results of a series of float, temperature and bacteriological experiments carried on during the past summer in Lake Ontario along the Toronto water front. We had been told by some the currents set westward, by some eastward, and so on; but the results showed in every case that surface wind currents ultimately determined the direction of the deep-water floats, that surface warm water was with certain strong winds drawn out into deep water by an undertow, and that these currents if bearing sewage would undoubtedly temporarily pollute the city water supply.

These same surface wind currents will similarly to some extent affect every river current, and while it may be true that a water pipe laid in deep water in mid-stream will escape much surface sewage pollution, it is no guarantee that such will always and invariably continue to be the case. Indeed in ponds and sluggish streams it has been shown by the Massachusetts State Board experiments that the deeper waters are often most polluted. Hence while the pollution of a stream is such as to cause most positively deleterious effects it will depend upon the relative location in the stream of the sewage current, and the current at the point whence the water is taken, whether the pollution will be much or little, constant or intermittent.

7. The last of the reasons I give here is that on which so much has been spoken and written, artificial removal of pollution. Artificial purification of some kind or other has been too long practised for us as sanitarians to ignore its utility. In an article at the recent Water-Works Association in Brooklyn on the Brooklyn Water supply the source of that wonderful underground supply and its freedom from contamination was set forth. There is exhibited the great natural system of intermittent downward filtration. It is nature's, and like everything that nature does if allowed her own time, it is perfect.

There is illustrated what is arrived at by water companies. They attempt it in various ways. The great London water companies have beds of sand acres in extent, through which water is not allowed to pass by law faster than at the rate of 8 cubic feet of water per cubic foot of filter area per day. This method is manifestly crude as some

days the clear river water may be well purified; at others this may be with increased pollution, imperfect. How imperfect such a filter may be is seen in the Tees epidemic already referred to, and to that related at the International Congress of Hygiene by Dr. Kümmerl, of Altona, below Hamburg.

This system has been reduced to something more scientific at Berlin, where the action of the filters is measured by plate-cultures made by the officers in charge; but what kind of a check valve is put on I do not know; and of how great practical utility it can be I cannot readily conceive; since if floods brought down excessive impurities, and the degree of bacterial pollution would require at least 24 hours to be measured, the river might be clearing by the time special filter beds were brought into requisition. However, it marks a positive advance in knowledge of the life history of the Spree at that point. That the results are far from complete is seen in the plea raised by Pettenkofer and others for a Rivers Commission to be appointed by the German Government to study in detail each river supply in relation to the towns supplied.

What sewage-farming has already taught us in the old world and what Massachusetts experiments have recently demonstrated, indicate that along quite another line than that of mechanical filtration it is possible to approach nature's method of intermittent filtration, which in my opinion is most economically carried out by letting nature measure the extent of grounds required and then by our taking the filtered waters from their native bed, as underground waters where contamination is impossible.

Basins for sedimentation, have in the past and must still in the future play an important part; but they are of necessity, except at great expense, always a crude and imperfect method. During the past year I have had an opportunity of experimenting with an artificial filter under pressure, and have to state it as my belief that there are very great possibilities in store for this method.

At St. Thomas the water supply is obtained from Kettle Creek filters by means of Hyatt filter. The Hyatt system consists of the addition of a small quantity of alum for each gallon of water before filtration, thus clarifying it considerably by the formation of a precipitate. It is claimed that this precipitate in falling entangles and brings down with it the bacteria, so that they are more easily removed by filtration. The filtration takes place through sand contained in large horizontal cylinders, provision being made for the reversal of the stream of water once in twenty-four hours, so as to thoroughly cleanse the filters.

In St. Thomas there are two of these filters, each with a filtering capacity of 500,000 gallons, and they are at present putting in an additional one. The following are some of the results:—

July 3rd	Before filtration	45,000	per c.c.
	After filtration	90	"
Oct. 23rd	Before filtration	(average) 1,240	"
	After filtration	(average) 44	"
Pumping at the rate of 1,324,800 gallons per 24 hours.			
Oct. 24th	Before filtration (10.30 a.m.)	(average) 1,380	"
	After filtration (10.30) filter 1 cleaned at midnight	59	"
	After filtration (10.30 a.m.) filter 2 cleaned at 10 a.m.	270	"
	After filtration (11 a.m.) both filters together.....	65	"
Pumping at the rate of 810,720 gallons in 24 hours.			
Oct. 26th	Before filtration	1,545	"
	After filtration	70	"
Pumping at the rate of 794,880 gallons in 24 hours.			

These results show a high degree of efficiency in the filters, as in the case of the examination of Oct. 23rd the pumps were sending water through the filters at a rate about one-quarter as fast again as they should.

The reason why they do their work is perfectly easy to understand, but the work to be done increasing almost daily it is likely to be found in practice—as, indeed, with all artificial methods—that the filters will be forced to try and do more than they can perfectly and with success accomplish.

Having, then, at some length set forth—

1. Why the question of pollution of streams has so long been one of controversy ;
2. Some of the evidences of pollution of streams, based upon statistics of disease ;
3. Some of the causes and conditions of pollution of streams ;
4. Why some streams fail to produce at all times outbreaks of typhoid ;

We may very briefly endeavor to sum up the question which we started out with, viz. :—

What attitude with our present attainments must we as Officers of Public Health assume in regard to the pollution of streams by municipal sewage and in what direction must we specially direct our energies ?

Doubtless for the present our action is limited on its executive side by the statutory enactments peculiar to each State or Province, but inasmuch as legislation is dependent ultimately upon the views we hold on these subjects, it is always possible and necessary to exercise on municipal authorities an influence which will materially aid in obtaining general enactments which will govern the disposal of sewage generally.

It is quite apparent that the density of population as it varies in different states and in the same state with increasing years of settlement, is the element which more even than preconceived scientific opinion forces upon the public and thereafter the legislature the discussion of what constitutes pollution and of what measures are to be adopted for preventing or regulating existing pollution. It would be most fortunate, however, if new states and provinces just entering upon the work of city-making should tend to copy legislature which has been forced upon older states, since the many questions of vested municipal rights and the interests of riparian owners could at such a time be adjusted in a way which at a future date may be found impossible without costly litigation.

The considerations already presented make apparent the fact that we need not expect off-hand to set down conclusions as regards details, which would be either universally applicable or accepted on all hands as correct. To illustrate this I quote one or two expressions of opinion by prominent sanitarians. Dr. Barry has stated that in his opinion “ It is still doubtful whether in England any river forty miles from its source can be considered a safe source of public water supply,” and yet the Government official water examiner states that more than fifty per cent. of the water supply of Greater London is taken from the Thames, and that the sewage of over 70,000 people was delivered direct in the river at points above the intake.

As already stated, Pettenkofer and others with him have concluded that Munich may be allowed with safety to drain into the Isar “ without any hygienic disadvantages to the inhabitants.” This opinion seems to have been based upon the following experiment—water was taken at Thalkerchen, a point on the river above Munich, and also at Treysing, below the city. The water showed precisely the same qualities. He adds, however, “ Of course, the natural chemical quality of any given water, as also the character of the river bed, its vegetation and strength of current—these would play an important part in the work of purification. Simple chemical, physical and biological influences must all be considered.”

W. Kuemmel, C.E., of Altona, holds, however, views strongly opposed to this. At the London Congress he related the details of an epidemic of typhoid at Altona, which city takes its public supply from the Elbe after a careful filtration. The city is situated below Hamburg. It appears, according to this statement, that the latter city takes its water from the river without filtering and with comparative safety. (This paper was written before the cholera epidemic.)

Without multiplying opinions as to the natural purification of streams, which chemical analysis shows goes on in many streams owing to processes already referred to, I quote, as bearing upon the point, the words of Fred P. Stearns, engineer to the Massachusetts State Board of Health.

*“ With larger volumes (of water) the pollution (from 2.5 to 7.0 cubic feet per second per 1,000 persons) is so small as to be clearly admissible from the standpoint of the offensiveness of the water.” Then he adds : “ In a stream used for domestic water supply it cannot be said, with our present knowledge, that any degree of dilution will make the water entirely safe for use.”

Whatever views, therefore, may be held on the various points coming up for consideration in connection with the disposal of the sewage of any individual municipality, the following three general propositions will, I have no doubt, meet with general acceptance :

1. That, as is stated in “ An Act to protect the Purity of Inland Waters,” passed by the Legislature of Massachusetts, 1888, “ The State Board of Health shall have the general oversight and care of all inland waters. It shall recommend measures for the purification of such waters, and for the removal of substances and causes of every kind which may be liable to cause pollution thereof,” or as stated in the Public Health Act of Ontario, “ Whenever the establishment of a public water supply or system of sewerage shall be contemplated by the council of any city, town or village, it shall be the duty of the said council to place itself in communication with the Provincial Board of Health, and to submit to the said board before their adoption, all plans in connection with the said system.

“ It shall be the duty of the Provincial Board of Health to report whether, in its opinion, the said system is calculated to meet the sanitary requirements of the inhabitants of the said municipality ; whether any of its provisions are likely to prove prejudicial to the health of any of the said inhabitants, together with any suggestions which it may deem advisable ; and to cause copies of the said report to be transmitted to the Minister of the Department to which the said Provincial Board of Health is attached, and to the clerk of the municipal council, and the Secretary of the Local Board of Health of the district interested.

“ No sewer, or appliance for the ventilation of the same, shall be constructed in violation of any of the principles laid down by the Provincial Board of Health, subject to appeal to the Lieutenant-Governor in Council.”

2. That those municipalities situated within the same drainage area, where streams, polluted with sewage from one municipality become, or are likely to become sources of public water-supply for other municipalities, be by law united by an Order-in-Council of the Governor upon the report of a State or Provincial Board into a Rivers Conservancy Board, said Board to act in conjunction with the State or Provincial Board in the consideration of town water supplies and sewage disposal within the area.

3. That in cases where rivers, lakes, etc., form interstate, interprovincial or international boundaries, or where the course of such passes from one State or Province into another, that interstate or interprovincial action be encouraged ; and that in those cases where streams come within the control of a Federal Government, such Government should urge interested States and Provinces to similarly appoint Conservancy Boards.

Amongst other conclusions, which I believe the facts warrant us in drawing, but upon which there may be differences of opinion are the following :

1. That no water into which sewage flows can at all times, and under all circumstances be considered safe for domestic supplies.

2. That there are streams and lakes, such as the Great Lakes, of such enormous volume that it is as yet possible to pour sewage into them and yet use their waters for public supply ; but that this can only be done in those cases where such distance intervenes

* “ The water supplied from the Thames to London is all submitted to the purification processes of subsidence and filtration, the filter beds of the different companies vary in detail, but are all constructed upon the same plan ; for example, the four filter beds of the West Middlesex Company (6 acres in total area) at Barnes, have a total thickness of filtering medium of 5 feet 3 inches, consisting of 2 feet 3 inches of Thames sand, 1 foot of Barnes sand, and 2 feet 3 inches of gravel of various degrees of coarseness ; beneath the filter beds there are collecting drains of 6 inches in diameter ; they are pierced and laid 20 feet apart.

“ Efficient filtration largely depends on the rate of flow of the water through the filtering medium. It is laid down as an accepted standard that the rate of filtration forming metropolitan waters should not exceed 540 gallons per square yard of filter bed each 4 hours, or 2 gallons per square foot per hour. Some of the London companies at the present time infringe this rule, and the filtration in practice is slower than the above.”

as shall allow time for the natural purification of water to have completed itself, and that this can only be known after careful and extended experiments, chemical, biological and baeteriological, in addition to currents and temperatures, carried out in different seasons, and under the varying conditions of flood and drought, etc.

3. That where ordinary streams in well settled districts are required to be used for public purposes owing to the lack of other source of supply, that every effort be made by Boards of Health to have the gathering grounds and sources of supply kept free from all forms of animal pollution ; and hence would urge that modern methods of sewage disposal, notably those of intermittent filtration, or precipitation with subsequent filtration, be forced upon the attention of cities and towns contemplating having sewerage works.

4. That few river waters are fitted for use without sedimentation, and filtration either by natural sand filters or some mechanical filter, as those through sand operate under pressure.

PART III.

ANNUAL REPORTS

OF

LOCAL BOARDS OF HEALTH.

CITIES.

BELLEVILLE.

Medical Health Officer's Report.

I beg leave to report that, in the spring, I had the usual notices issued for the cleaning of yards, emptying and disinfecting water-closets, etc. The public responded fairly well to the notice. The Inspector gave each police officer a ward to look after, and he made a house to house inspection of his district, so that every part of the city was thoroughly looked after. Any nuisance found was ordered to be abated. I may say that, during the past year, the work of emptying and disinfecting privy pits and cesspools, has been more thoroughly done and observed, than in any previous year for some time past. Just here, I wish to thank the Inspector and his assistants for the prompt assistance given me, in the discharge of my duties, whenever required.

I have had reported to me, up to the 1st of December, twenty-six cases of typhoid fever, with three deaths; seventeen cases of scarlet fever, with one death; forty-five cases of measles, with no deaths; twenty five cases of diphtheria, with four deaths. In all cases of infectious diseases, when reported, the houses were promptly placarded, and all necessary precautions taken to prevent the spread of them.

During the spring, there was an outbreak of typhoid fever on Cedar, Ernest, and North Bridge streets, some 12 cases in all. My attention having been called to it I, with the Inspector, made a personal inspection of dwellings and yards of the sufferers, inquiring more particularly, where they obtained the water for drinking and household purposes, and found that the majority of them obtained the water from a well, known as the Cedar street well, on Cedar street. We inspected the dwellings in the locality of the well, and from the surroundings decided that the well was the source of the trouble. The parties were warned not to use the water, as we considered it unfit for use; they, therefore, stopped using it and no other cases occurred after that. I at once called a meeting of the Board of Health, and laid the facts before them. The Board ordered the well to be closed up. Doubt having arisen as to the well water being bad, I sent two samples of the water to Toronto to be analyzed, and received a report from the analyst stating that the water contained a large quantity of animal matter and was unfit for domestic use. I then caused the well to be closed permanently.

I would suggest to the council the advisability of closing up, as soon as possible, all the public wells on the streets, they being in my opinion, from the position of the drains in the streets, very likely to become contaminated, and to be a source of danger to the people. I would again urge the council to proceed with drainage as soon as possible, and would particularly call their attention to several places, which should be attended to at once: 1st, the Guin street drain; extension of drain on Foster avenue from corner of Bridge street to the bay; drain on George, William, Albert, Ami and John from Alexander to Dundas, thence to the bay. My reasons, for mentioning these streets more particularly, are that a greater portion of the inhabitants have the water works water for domestic use as well as for water-closets, and have no proper service on the streets named to carry off the sewerage, which must be, in my opinion, dangerous to the health of the inhabitants in that locality. I would also strongly urge the council to extend the sewer from the corner of Hotel up Front to the upper bridge, giving relief and health to those living on that part of Front street. Also at the G. T. R. station, the drain from Brassey street should be deepened and carried to the river. A quantity of stagnant, filthy water lying in the drain on Foster avenue during the summer being, in my opinion, the cause of several cases of diphtheria and scarlet fever, which has been more prevalent in that

locality for the past year, than other parts of the city. I would again urge the council to pass a By-law doing away with privy pits for the whole city, and if that cannot be done would strongly urge the absolute necessity of one being passed to close up and thoroughly disinfect, all privy pits on Front and Pinnacle streets, from the wharf to the upper bridge, and putting in the dry earth closet system. My reasons for so asking are these: we all know that owing to the shallowness of the soil in the locality mentioned, there not being over three feet of soil to the rock, the ground has become thoroughly saturated with animal matter. Cholera, diphtheria, scarlet and typhoid fevers breed in just such a soil, and it being almost certain that cholera will make its appearance next spring, it will be criminal neglect on the part of the council and Board of Health, if they do not do everything in their power to prevent it getting a foothold in our midst, by placing the city in the best sanitary state possible, so that, if cholera should appear, we will be prepared to meet and control it.

I would again request the council to pass a by-law licensing one or more scavengers for the city to remove all garbage, night soil and other refuse, and at once to provide a proper dumping ground for the depositing of the same. It is impossible to keep the city clean and healthy without such a place. The city owns several water lots, which could be used for such a purpose, if proper rules were adopted for the management of the same, and a man appointed to look after it.

The mortality of the city has been lower this year than for some years past, the deaths being, from November 30th, 1891, to November, 1892, 152.

The slaughter-houses have been kept clean and regularly inspected, and no complaints have been made regarding them for the past year.

I issued some forty notices for the abatement of nuisances, which were served by the police and myself personally.

Complaints have been made to me of the unsanitary state of some cellars on Front street. In a great many cases the cellars are lower than the drains, and consequently water lies stagnant in the cellar. I have ordered all cellars to be filled up to the required height, and the drain to be properly trapped, so that there can be no escape of sewer gas into them. The market square has not been kept in a proper state this past summer notwithstanding attention has been frequently called to it. I would suggest that it should be thoroughly swept with the street broom at least once a week during the summer months, and all decayed vegetable and other matter be carted away after each market day.

In conclusion, I would again urge the city council in the matter of drainage. Fancy the arrival in the spring of that dread scourge, cholera. Let us do all we can to place the city in such a state, from a sanitary point of view, that if it should make its appearance in our midst we may have the satisfaction of knowing that we are to a certain extent prepared for it, and placed the citizens generally, in as favorable position as possible to prevent its spreading or getting beyond our control.

R. TRACEY, M. D.,
Medical Health Officer.

BRANTFORD.

Medical Health Officer's Report.

I have the honor to present the following report for the year ending November 1st, 1892:

Mortuary Statistics.—The number of deaths in the city during the year was 221, which gives a rate of 14.3 in an estimated population of 15,400. Twelve of these deaths were of persons over 80 years of age, 30 over 70 years and 51 over 60 years,*55 were under 5 years and 48 under 1 year.

The deaths from zymotic or preventable diseases, including cholera infantum and consumption, were as follows, with comparisons for five previous years :

—	1892.	1891.	1890.	1889.	1888.	1887.
Typhoid fever	2	6	11	9	13	8
Diphtheria	3	5	6	13	10	19
Scarlet fever	1	1	1	1	1	2
Measles	1	1	1	1	1	7
Whooping cough	1	1	1	4	5	7
Cholera infantum.....	13	20	10	18	26	33
Consumption	22	2	22	18	17	21

There were in all, 55 cases of typhoid fever reported, most of the cases have been very mild. The two deaths occurred, one in November and one in December, 1891. Not one of the above 55 reported cases was fatal, and in fact from January 1st, 1892 to December 1st, there was no death from typhoid. One death unfortunately occurred on December 4th, inst. The disease was contracted in another town, but the death is necessarily recorded in Brantford.

The effect of this material reduction in the amount and severity of typhoid fever upon the number of patients in the hospital, has been very marked. There are at present, December 5th, 12 patients only altogether, and the number throughout the fall months has not been over half the number of previous years.

Of the 55 reported cases of typhoid fever, 45 had been using unboiled water of Brantford wells, one had used well water at Cainsville, and two had been living in Chicago and using the city water there. The remainder had been using Brantford city water. Four of these seven cases, which had been using Brantford city water, were in one dwelling house which had a sink and bath discharging into an unventilated soak-pit, which had not been emptied for several years. The house was, owing to this, badly contaminated. The remaining three cases which had used city water, were all in another dwelling. At this place, a well at the kitchen door had been discontinued, but instead of being filled up had been kept as a receptacle for liquid refuse from the house and stable. There was also close to this dwelling, an old cistern in an offensive state. I am glad to state that in both of these cases sewer connection has since been made, and the unsanitary condition removed.

It is idle to expect that even the unusual use of pure water will prevent the recurrence of filth diseases, if such grave insanitary conditions are allowed to exist. The above named facts require no comment. I may, however, before leaving the subject of typhoid fever, mention the fact that one of our Brantford nurses was sent to Tilsonburg some time since to nurse a case of typhoid fever. I have ascertained that the well water used by the family, and for some time by this nurse, was bad. She contracted the fever, returned to the hospital, and I deeply regret to say, her case terminated fatally last Sabbath morning.

Miss Waite was a thoroughly qualified and excellent nurse, she had the most gentle and gracious manner and her heart was in her work. Largely through her efforts her patient at Tilsonburg recovered, but her young and precious life was sacrificed. Her death is a public loss, and she died from a preventable disease due to bad sanitary conditions.

Diphtheria and Scarlet Fever.—As shown in the table above, there were in the year ending November 1st, only two deaths from diphtheria and one from scarlet fever. The whole number of cases reported was, of diphtheria 49 and scarlet fever 29. On the occurrence of any cases of these diseases, every effort has been made to prevent their spread by notification, disinfection, exclusion from schools, by isolation so far as possible, and in fatal cases by prompt and private burial under stringent precaution.

A considerable degree of success has apparently attended these efforts for several years up to the end of the statistical year.

I regret to say that the record for the coming year beginning on November 1st, ult., promises to be not as favorable. There were, in the month of November, five deaths from

diphtheria, and it may be impossible to prevent the further spread of this disease. Diphtheria and scarlet fever are filth diseases. Whatever may be the first origin of the germs of these diseases, their development is undoubtedly due to filth. All cases of these diseases either arise where some bad insanitary condition exists, or if occurring where the sanitary conditions are good, they are communicated by personal infection, or by means of domestic animals or are conveyed by milk, water or other ingesta. In the present epidemic a majority of the cases have arisen in houses having sinks or baths mostly connected with filthy drains discharging into cesspools.

I give one or two examples, out of a large number of cases, illustrating this fact. In one dwelling in which three cases of diphtheria were recently reported, it was found that the bath waste discharged into an abandoned well, carefully sodded over and admitting of no ventilation, except back into the bath room. A bed was temporarily placed in this room, and in six days the occupant was taken down with diphtheria, later on two others of the family took the disease. In the Orphans Home, diphtheria broke out some three years ago. On inspection, it was found that the lavatories and sinks discharged through a filthy wooden box without any trap, into a soak-pit. The matron complained of the offensive atmosphere in the house especially in the mornings. The pit was filled up, and disposal of the wash water on the grass and shrubbery was advised. A few days ago scarlet fever broke out in this home, and on inspection it was found that a new soak-pit had been excavated and the old system re-established. These cases are samples of many others, and it is obvious that any degree of immunity from these diseases can never be expected, if such dangerous nuisances are not abolished.

I believe it is safe to assert that in no city in Canada are, notification, exclusion of affected or suspected cases from school, disinfection, etc., as well carried out as they are in Brantford. But I also am compelled to say, that so far as I can learn, Brantford is the only city in Canada which refuses hospital accommodation to cases of diphtheria and scarlet fever. The most effective known means for arresting an epidemic at its outset is thus denied us. Here is a danger which menaces every home in Brantford, and I have in previous reports earnestly, but without effect called attention to it and to its remedy.

It would be easy to cite any number of instances illustrating this danger, I shall merely mention the last one I know of which occurred within a few days. A young girl eleven years of age, in a poor family, was attacked with diphtheritic croup. The dwelling was beyond the city limits, and there was no notification. Two sisters who were relatives of the patient, and who were domestic servants in two different families in the city, where they had the partial care of young children, assisted in nursing the diphtheritic patient, being allowed to go there on alternate nights. After some days, one of the sisters on going to a doctor's office, was found to have her throat loaded with a mass of diphtheritic exudation already in a putrid state. The employers of these sisters looked with terror on the idea of their remaining in their homes, and they both found refuge in the little cottage in the suburbs, containing only three small rooms. There they now are, seven in the family, two seriously ill with diphtheria. Comment is needless. Near by in full view of this cottage stands the hospital with 12 occupied, and 25 vacant beds. If there were no other resource, there is no sufficient reason why one wing of this hospital could not be completely isolated, and used for these cases. This is done in neighboring cities, and has always been so done. Dozens of cases have been continuously so dealt with in the Toronto General Hospital, without any contagion arising, until last year they became so numerous that a separate hospital was required. But there are other resources, and it is not necessary to devote even any unoccupied portion of the present hospital to diphtheria and scarlet fever. It is only necessary to carry out the purpose of the founder of the hospital, the late John H. Stratford, and erect the small hospital annex proposed by him, approved of by the whole hospital staff of ten physicians, and which was about to be erected at the time of his lamentable death.

Of the self-denying and self sacrificing labors of the president and board of governors, and especially of the president, for everything which relates to the welfare of the hospital I am deeply sensible, and I trust that the imperative needs of the case will induce them to take up this matter without hesitation, and carry it out according to the views of the medical staff repeatedly expressed. The City of Brantford may thus, at a trifling annual

expense be fully equipped to deal with the serious question of contagious diseases, and may be spared the large and unnecessary expense of establishing and maintaining an entirely separate hospital, for which there would usually be no use during a large portion of the year.

Small pox Hospital.—According to the directions of this board, the hospital building at Mount Hope has been thoroughly repaired, and at a very moderate cost. In the event of cholera or small-pox occurring, we would be able to put in some furniture, and have a portion ready for use in two or three hours. It would be well to have a large number of trees planted on the north and east aspects of the building, and I recommend that the use of the land should be granted to some one who would do that work, and keep an eye to the building.

Water Supply.—Between 400 and 500 additional water services have been supplied during the year, and it is expected that by the end of this year nearly 1,300 services will be in operation. There has been no necessity to enforce the abandonment of wells, first, because public opinion is setting in strongly against the use of well water, derived as it is from the rain fall percolating through filthy back yards, etc. ; and, second, because very many persons, who hugged the delusion that their particular wells were supplied by springs derived from some remote and immaculate source were promptly undeluded by having their wells dried up by the newly constructed adjacent sewer.

The prospect is now good for the general abandonment of well water for domestic uses, and more gradually the utilization of our unsurpassed sewerage system, which is a necessary complement to the free use of city water. These results should be anticipated with the greatest satisfaction, having regard to family convenience and comfort, and especially to the public health.

Milk Supply.—Exclusive of private supplies there are at present 24 dairies having 342 cows supplying the city, and the daily supply from them is 2,238 quarts.

The dairies have all been thoroughly inspected by the sanitary inspector, and all found to be in a clean and wholesome condition.

Starch refuse has been practically abandoned as a food. Hay, grain, chop, etc., being chiefly used. Three general tests of milk have been made during the year with the Babcock tester. The average percentage of butter fat was in April 3.78, in July 3.69, and in November 3.90, the whole average being 3.79 as compared with 3.60 last year, and 3.20 in 1889. The quality is now to be regarded as excellent, and it is important that the efforts to keep it so should not be relaxed.

Sanitary Inspection.—Besides the records of milk inspections and examinations above referred to, the sanitary inspection books show that 915 house to house inspections were made during the year, 407 complaints of nuisances, etc., were attended to. The two slaughter houses were inspected and were found in good condition. 290 pits were emptied by order of the inspector, and of these 125 were filled up ; 38 special notices to abate nuisances were served. About 60 notices to make sewer connection were served, 40 of which have already been made according to notice, 40 samples of water were tested, 21 of which were found bad. 23 police court prosecutions were made. In 12 cases there were convictions, the fines amounting to \$65.50 ; 11 cases were discharged on the nuisance being abated. 167 notices of contagious diseases were sent to the public schools, besides a large number to the other schools and Sabbath schools, and to the Free Library.

The disinfection of a considerable number of books which have been quarantined at the Free Library will complete the work of the year.

EGERTON GRIFFIN, M.D.,
Medical Health Officer.

GUELPH.

Medical Health Officer's Report.

During the year, in all 188 deaths were registered, which gives for our population of 11,000, a mortality rate of 17.09 per thousand.

The sanitary inspector's books show that 184 cases of diphtheria were reported, of which 37 proved fatal; 15 cases of scarlet fever, without a death, and 8 cases of typhoid fever with one death. The epidemic of diphtheria, which we had last fall and winter was practically stamped out in May, and I am pleased to be able to state that the last death from any form of contagious disease, occurred early in June.

It is the opinion of many good authorities on the subject that scarlet fever, measles, small-pox and diphtheria are propagated by contagion from the sick, directly or indirectly to those exposed. Indirectly, we frequently have it arising from school rooms and public places of assembly being infected by emanations from the sick. Public conveyances, and even the clothes of those who come in contact may carry the contagion. The convalescent may also infect for a considerable period. Another important feature, especially in reference to diphtheria, is that a person may actually have the disease without knowing it. The usual false membrane, and other signs and symptoms, on inspection may not be observable, yet such person is highly dangerous to others. It is therefore evident that early recognition, followed promptly by isolation and thorough disinfection, are factors of great importance, in combating an epidemic. These measures, on the whole, have been carefully carried out in this city.

A word about cholera. Many believe it quite probable that the scourge will reach Ontario next summer, and should their fears prove to be well founded, special measures will be necessary on our part.

At the last meeting of the Board of Health, we ordered as a precaution, an extra cleaning of yards, and other places where garbage tends to collect. We also took steps which will enable us, without delay, to deal with an outbreak, should it unfortunately appear, in our limits.

In order to improve our position to cope with the disease, especially since we have, as yet, no efficient system for the removal of garbage, I recommended the citizens to burn in the kitchen stove all vegetable and other combustible refuse, for by so doing the spring will find us with a greatly reduced amount of decomposable matter.

Guelph has good water-works, of which we are justly proud; the general contour of the city of the city, and the nature of the subsoil, are favorable to natural drainage of storm water; its citizens, as a rule, are in favor of any reasonable scheme to improve its sanitary surroundings; and, what is not to be overlooked, the Sanitary Inspector is capable, energetic and untiring in the discharge of the duties connected with the office he has so long held.

But how can our sanitarians work to advantage, when we have no provisions for the disposal of night soil and garbage, other than the condemned and barbarous privy-pit for the former, and an annual removal for the latter? To add to our danger, about half a million gallons of water are daily pumped into the city, and there is no drain worthy of name to carry it away.

It has long been conceded by persons competent to judge, that a system of water-works necessitates a system of drainage, and *vice versa*, else the sanitation is imperfect. It is useless to deny the fact, that the time has come when we must either have sewers or else run considerable risk from the ever increasing contamination of soil and air due to our primitive method.

My predecessor, the late Dr. Keating, again and again called attention to this important subject, but our city officials failed to profit by his advice. Brantford, Berlin, Brockville, and other Canadian cities and towns of our size have successfully overcome the difficulty by constructing works on the new or separate sewerage system. This system is very effective, and costs much less than the combined method of drainage. Our position renders it very applicable for the requirements of the city. The authorities would

merely require to construct sewer trunks, build automatic flushing tanks, provide a sewage farm, and a few other details, then the remainder could be done under a local improvement by-law. Persons in a position to estimate put the cost to construct it here at less than \$70,000. When we consider the need and importance of the work in regard to the welfare of the city, the cost is certainly moderate. Further delay, in my opinion, is hazardous, not only to our sanitation but also to our prosperity. It is to be hoped that the members of the city council may see their way clear to employ an engineer to make the preliminary surveys and estimates; submit these to a sanitary engineer of experience for approval, and when the spring opens have everything ready to proceed with the work.

It is also advisable that the city health by-law should be so amended, as to make it compulsory for citizens within certain limits, to have their garbage removed regularly once or twice a week by a person appointed, and under the control of the Board of Health.

With sewerage and proper disposal of garbage, Guelph will speedily stand second to no other place in the Dominion, in a sanitary respect.

The Inspector's report to me bears its own testimony, and amply proves that his office is no sinecure.

The fact that little or no friction resulted, speaks much for his ability and tact.

H. HOWITT, M.D.,
Medical Health Officer.

HAMILTON.

Medical Health Officer's Report.

It gives me pleasure to be able to report, during the past year, ending the 31st October the health statistics of the city (the annexed territory being included), show our sanitary condition to have been satisfactory. The total mortality of our citizens was 670, being 11 less than the previous year without the annex. Although our population must now be fully 50,000, I will take the figures of the last Dominion census which did not include the recent addition. The population then was 48,908. This number places our death-rate at 13.69 per 1,000.

On referring to the death rate of the past few years, I find that in both years of 1876 and 1877 it reached over 21 per 1,000, and that it has gradually decreased to the present low rate. Will sanitary work get any credit for this? If not, why not?

I think that a lower rate will yet be accomplished, when existing nuisances become things of the past.

Contagious diseases with resulting deaths have not been excessive, although there has been an increase over last year. The combined cases of scarlatina, typhoid and diphtheria number 234 with 14 deaths. Cases of measles, whooping cough, mumps and chickenpox have been reported to the number of 88.

Children who have recently had contagious diseases, are allowed to mingle too soon with the healthier. This is a great mistake which has proved occasionally to be a very serious one, and should be guarded against, in all schools, and other public or private gatherings. A fatal case of diphtheria has been lately reported. The disease appeared to have been contracted from a child who had it in Detroit, but was brought on a visit here after supposed convalescence. This child kissed the child who died. Was this merely a coincidence or did the visitor still retain the germs of infection? Cases of this kind, however doubtful they may seem, should cause parents to be more careful in keeping their children away from the recently sick, and also prohibit that prevailing habit of kissing so frequent amongst children. Many children now attend the public schools who have never been vaccinated. This should not be permitted. I do not see any very urgent necessity for enforcing vaccination upon those who have once been successfully operated on, but all others should—the principle that an ounce of prevention is better than a pound of cure is a very sound one to adopt. It is said that the disease is now spreading in England, and it is not impossible that a case might be landed in our midst, unless every passenger vessel was subjected to the extreme inconvenience of a prolonged quarantine.

The recent special inspection of the city has been productive in causing a larger number of pestiferous privy pits than usual, to undergo the process of cleansing. The removal of their contents to make room for a fresh supply may prove a convenience, but it does not quite accord with that degree of perfection required for healthy sanitation. Some careless people use those pits as receptacles for refuse (which should have been placed in the scavenger barrels), rendering them particularly obnoxious. Your Inspector should have special instructions to deal with such places at once, by causing them to be cleaned out immediately and filled in with clean earth forever. Not being fully versed in municipal legislative powers, I may possibly err regarding the feasibility of what seems to me practicable, but in order to stimulate (if that is possible) a more rapid extinction of privy pits, I would suggest the propriety of placing a tax upon all such where the sewers are convenient for use, and also that water for flushing one water-closet in each private dwelling house in the city, should be granted free, so that the exchange of the pit for the closet would be in the interest of both landlord and tenant.

On a previous occasion I alluded to the difficulty persons had in getting sewers, where that accommodation was needed. The obstruction still prevails, and the annual sewer appropriation has never been sufficient for the requirements of the city. Sewers are now wanted in many places, and the outlet of all sewage should be diverted from entering the bay at any point west of Ferguson avenue, this can very easily be effected from James street north to that point, and connections made with James street sewer, could carry off most of the sewage north of the G. T. R. and east of Bay street, if money was supplied for that purpose. Your city engineer could overcome other difficulties, if any. It is to be hoped that no impediment will occur, to delay the construction of sewers in the south-west part of the city where they have been much needed.

In selecting the boundaries for cutting ice during the coming season I would respectfully ask your board to make no distinction in the quality of the ice to be cut, but that it shall be fit for domestic use. Ice that has hitherto been used for cooling purposes, should not be tolerated any longer. I cannot conclude without observing that two blocks of ice were cut from our bay last March and taken to Toronto, by whose authority I don't know. This must have been the ice selected to compare with the Toronto Bay ice. The report appeared in the *Empire* and was published as emanating from an official of the Toronto Board of Health, otherwise I would not notice it. The blocks must, undoubtedly, have been cut from the mouth or close vicinity of a sewer, for none other from our bay could compare with the standard of Toronto Bay ice. We have an analyst now residing in our city who is fully competent to analyse ice, it might be advisable in drawing the boundaries to have the ice tested by him, taken from different points of the bay.

The following tables illustrate the decrease in the death-rate during the year; show that infant mortality was also less than formerly, and also the location and number of infectious diseases.

Table of death rates.

Year 1881-92.	Totals.	Males.	Females.	Monthly rate per 1,000.
November	50	23	27	1.02
December	61	29	32	1.26
January	86	41	45	1.75
February	67	37	30	1.36
March	59	30	29	1.02
April	41	18	23	.84
May	41	21	20	.83
June	44	24	20	.89
July	50	23	27	1.02
August	76	41	35	1.54
September	54	25	29	1.01
October	41	21	20	.83
Totals	670	333	337	

Deaths 670, population 48,908, rate per 1,000, 13.69.

Appended to this is a table showing that there were 602 interments in Hamilton cemetery, 165 in the Roman Catholic cemetery, and 77 sent to foreign burial grounds. Here is another interesting table :

Deaths by Wards.

	1	2	3	4	5	6	7	Totals by months.
November	8	4	8	11	4	6	9	50
December	4	9	10	7	7	14	10	61
January	8	12	10	13	7	20	16	86
February	5	8	13	6	4	16	15	67
March	4	4	15	5	7	8	16	65
April	2	3	13	5	3	9	6	41
May	2	5	5	6	6	10	7	41
June	2	10	3	7	1	13	8	44
July	2	2	12	9	5	7	13	50
August	7	11	11	13	11	13	10	76
September	7	5	12	12	4	9	5	54
October	5	6	4	5	7	8	6	41
Totals by wards.....	56	79	116	99	66	133	121	670
Totals by wards in 1891.....	56	54	113	116	86	109	147	681

Of the deaths credited to ward 2, 9 died in St. Joseph's Hospital.

Of the deaths credited to ward 6, 8 died in the House of Refuge.

Of the deaths credited to ward 7, 37 died in the City Hospital.

Deaths south of King 251, as 223 previous year.

Deaths north of King 419, as 458 previous year.

By comparing this year with last year it will be noticed that the redistribution of wards has affected the mortality somewhat in most of the wards, Nos. 2, 4 and 6 being increased, while No. 7 is decreased.

Report of Contagious Diseases by Months and by Wards.

Contagious diseases by months.	Scarlatina.		Diphtheria.		Typhoid fever.		Total cases reported.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
November	16	1	2	..	8	1	26
December	7	..	1	1	5	1	13
January	5	..	3	..	2	1	10
February	10	..	2	1	1	1	13
March	11	1	..	..	4	3	16
April	4	..	..	..	4	..	8
May	12	..	3	..	3	..	18
June	3	..	..	..	5	..	8
July	6	..	1	..	2	..	9
August	11	..	1	..	15	1	27
September	20	..	2	1	21	1	43
October	20	..	5	..	9	..	44
Totals	135	2	20	3	79	10	254

By Wards.

Contagious diseases by wards.	Scarlatina.		Diphtheria		Typhoid fever.		Total cases reported.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Ward No. 1.....	13	1	3	..	6	..	22
Ward No. 2.....	10	..	..	..	14	1	24
Ward No. 3.....	33	..	1	..	15	5	49
Ward No. 4.....	18	..	7	2	17	..	32
Ward No. 5.....	13	..	3	..	14	1	30
Ward No. 6.....	14	..	3	..	9	1	26
Ward No. 7.....	34	1	3	1	14	2	51
Totals	135	2	20	3	79	10	234

Dr. Ryall continues : This year (compared with the previous) shows a very satisfactory decrease in the mortality of children. The total under five years of age was 195, against 237, being 42 less. Of the former number 139 were under 1 year, against 179 the year previous, showing a decrease of 40. The principal causes of death of those under 1 year were: Premature births 23, infantile debility 8, convulsions 13 and diarrhoeal diseases 33. One might reasonably expect a larger mortality from diarrhoeal cases, owing to the excessively warm weather encountered during the months of July and August.

Accidents seem to be a prolific cause of death, 18 having occurred during the year. One citizen was shot in the country and another was killed by a trolley car in Toronto, while 16 others occurred in the city from various causes. Five suicides were also reported, one of which took place at Guelph. I presume that all those accidents, as well as other minor calamities and eventualities, are attributed mainly to the "will of God."

Of the non-resident burials 29 were from the United States, of which a few were suicides; 12 were from Toronto; 23 from the township of Barton, which number includes 17 from the Lunatic Asylum. The remainder were from other different parts of the Dominion, including one from Winnipeg, and one from British Columbia. The large number of non-residents buried annually in our cemeteries will soon help to fill up all available space.

The non-residents dying in the city, came here for treatment and died in the hospitals.

J. RYALL, M. D.,
Medical Health Officer.

KINGSTON.

Medical Health Officer's Report.

I beg leave to lay before you my Annual Report on the sanitary condition of our city, also the Health Reports and those concerning the work performed by the Health Department, during the year 1892.

These documents show that many desirable improvements in the sanitary system have been made, and that several much needed requirements have been introduced with most satisfactory results.

The sanitary condition of any municipality is indicated by the number of deaths from zymotic or preventable diseases. I regret very much, however, to state that I am unable to furnish these figures owing to the Dominion Government having ceased to collect such statistics. Those procured by the Provincial Government are incomplete and render it impossible for me to furnish accurate local returns.

Schools.—The overcrowding of our public schools will soon be remedied by the erection of Victoria school, a new eight-room building situated on Union street (between Alfred and Frontenac streets), at a total cost of \$20,000 with accommodation for at least 400 pupils. The site is all that could be desired, being on high ground and affording a beautiful view of the lake to the west. The rooms are large and airy, the seats comfortable and substantial, and there is abundance of space in the play grounds. The school board aiming at providing the most perfect system of heating and ventilation decided to place the Smead-Dowd system in the building. It is hoped that the system will afford perfect sanitation and leave no room for complaint in this respect.

Infectious Diseases.—We have had during the year, a very great number of cases of zymotic diseases reported, of which measles prevailed to an alarming extent in the month of February, necessitating the closing of one of the public schools. Fortunately the disease was of a very mild type, only two deaths resulting therefrom. Typhoid fever made its appearance in the spring and has prevailed to a limited extent—the deaths being comparatively few—lastly, scarlet fever made its appearance in the month of November but of such a mild character that it did not necessitate the assistance or advice of medical interference to any extent.

	Typhoid.	Diphtheria.	Scarlet fever.	Measles.	Whooping cough.
	Cases.	Cases.	Cases.	Cases.	Cases.
January	6	2	8	28	..
February	10	1	2	48	2
March	16	..	1	2	..
April	18	1	..	2	..
May	10	..	..	..	..
June	6	..	3	..	..
July	3	1	1	..	..
August	1	..	..	..	..
September	1	..	..	..	..
October .....	..	..	4	..	..
November	1	1	20	1	..
December	4	..	21	..	..
Totals	76	6	60	81	2

Ambulance.—Kingston has now a well equipped private conveyance for the removal of persons suffering from contagious or infectious diseases. Its services can be procured at all hours at a reasonable cost, and in cases of inability to pay, it can be procured free of charge on application of the Local Board of Health. It is both unwise and dangerous to have patients, suffering with those diseases, conveyed in cabs, or other vehicles used for the conveyance of the travelling public.

Scavenger Work.—The removal of garbage this year has been more systematically attended to and regularly removed than ever before, yet it would require the constant supervision of the Sanitary Inspector to compel some citizens to have their garbage and other refuse matter attended to, thereby preventing its being dangerous to the public health. However, it is a source of satisfaction to us to be able to report that all orders, both verbal and written, given by this Board for the abatement of such nuisances have been generally complied with.

There were issued during the year 656 permits for the emptying of privy vaults, from which was taken 30,894 cubic feet of night-soil. Dead animals to the number of 109 were removed from the public streets and harbor, all of which were buried in trenches upon the nuisance ground outside of the city limits.

Dry Earth Closets.—There are now in use 288 dry earth closets throughout the city which are giving better satisfaction than former years. To make this system more complete, I would recommend that galvanized iron buckets be used, instead of the wooden boxes or tubs, which are apt to become foul from the soakage taking place. A sample of galvanized iron bucket can be seen in the office of the Sanitary Inspector.

Slaughter Houses.—These have been inspected regularly during the year (from May to November) and found to have been kept clean, and without complaint. At the same time I would recommend that all slaughter houses be removed outside of the city, or else one common abattoir be erected by the corporation for the use of all butchers within our limits.

House to House Inspection.—The police constables made a house to house inspection of all premises in the city, and from their reports go to show that the city has been in a better sanitary condition, than for many years past. The following is a summary of the reports: Number of yards inspected, 1,435, 1293 of these were upon first inspection reported clean, and 142 as dirty; number of privy vaults inspected, 1371, 1218 of these were upon first inspection reported clean and 152 as dirty.

Cellars.—There were twenty-four cellars and drains which were complained of as being out of repair and unsanitary. Upon investigation some were found without proper ventilation. Some required to be drained, others having no traps to the drains and others required to be cleaned out on account of deposits from defective drainage and decaying wood. Most of the above premises are situated in the line of Princess street. I am very happy to state that in all these cases the remedy applied has been gratifying to me and satisfactory to the occupants.

Water Supply.—I am glad to note that 4,721 feet of new mains have been laid during the year, making a total of twenty-three and a half miles of mains in use up to the present time. That 150 service pipes have been added during 1892, making a total of 2,128 services in use to date.

Sewers.—There have been constructed under the Local Improvement Act during the year, 1,617 feet of twelve inch, and 765 feet of nine inch tile sewers, at a cost of \$3,818.90. There still exists in the city 35,400 feet of old stone drains, which I hope will be removed in the near future and tile sewers constructed instead, as those drains are a menace to the public health. I am further pleased to be able to state that the council in its wisdom has seen fit to have two by-laws passed, which I consider necessary in the interest of the health of the people, one being the regulation of the construction of branch drains which must now be done under the supervision of the city engineer, the other by-law making it imperative on the parts of all owners of occupied property to provide sinks on their premises for the carrying off of waste water, slops, etc.

Ice Supply.—All ice used for household purposes must be obtained outside the limits laid down by the Local Board of Health, which secures to the consumer as pure ice as can be obtained from the lake, and only ice for cooling purposes can be taken within the limits after a permit has been granted by the Inspector.

SAMUEL H. FEE, M.D.,
Medical Health Officer.

LONDON.

Medical Health Officer's Report.

GENTLEMEN,—I beg to submit my annual report upon the sanitary condition and health of the city for the year ending November 15. The Federal Government having ceased the collection of mortuary statistics, the death-rate for the year cannot be accurately ascertained. Nevertheless, I have every reason to believe that the rate of mortality will not exceed that of last year, which was the lowest in the Dominion.

One hundred and thirty-seven cases of infectious diseases were reported by physicians, divided as follows: Measles 2, diphtheria 30, typhoid fever 33, scarlet fever 76. Of these 10 of diphtheria, 3 of scarlet fever, 22 of typhoid and 2 cases of measles were sent to the City Hospital. The mortality from all was light.

One hundred and forty-one citizens' complaints were received and attended to, compared with 103 last year. Twenty-five samples of well water were examined—16 of these wells were found to be contaminated, and caused to be closed, the other 9 were good; 16 cesspools and privy pits were closed, 9 persons compelled to connect their premises with public sewers, and 4 houses were condemned, being unfit for habitation.

Two-hundred and fifty-eight samples of milk were examined during the year, and 61 herds and dairies visited twice, making 122 visits. In general the herds were in fair condition and clean, and some exceedingly good and well kept. The quantity of milk supplied the city by vendors was, with a few exceptions, good, only 4 samples fall ing below 3.25 of butter fat. Semi-annual reports of these inspections, together with the quality of the milk, are made to the Board and published in the daily newspapers of the city for the information of the people.

Notwithstanding the apathy, and, in many instances, opposition, manifested by some of London's citizens with reference to keeping their premises clean, the work accomplished by the Sanitary Inspector, Mr. Bell, and the assistant, Mr. Lutman, has been well and thoroughly done, as will be seen from the following table:

Premises inspected	10,463
Premises reported not clean	126
Closets reported not clean	1,967
Cesspools reported not clean	29

The work of cleaning is still going on, and before the end of November the city will be in a good sanitary condition—indeed, better than it has ever been before.

Analysis of samples of ice, and also of water taken from the places where ice is cut for the supply of the city, have been made by the public analyst, Dr. Harrison, a report of which I have already laid before the Board.

In view of a possible visitation of cholera in the spring, the action of the Board in bonding a lot upon which an inexpensive building can be quickly erected when needed, to be used as a cholera or small-pox hospital, was wise.

Decomposing organic matter being one of the most fruitful sources of diphtheria and some of the fevers, a sub-committee appointed by the Board divided the city into four districts for the collection of garbage, and, calling for tenders for its removal, twice a week, from the 15th of May to the 15th of September, and once a week during the remainder of the year. From some misconception of the amount of the work to be done, or an inordinate desire to become suddenly rich, the tenders were surprisingly high. There is no doubt that the difficulty of disposing of this garbage, and the possibility of having to transport it long distances, has much to do in making the tenders so largely in excess of the actual cost of removal. This shows the necessity, not only upon economical grounds but as a conservator of the public health, of the city having a crematory.

Were it not for the long-distance hauling, the same quantity of garbage could readily be removed at one-half the cost. A crematory large enough for the city, could be built for about \$1,200, and need not be kept burning more than two days in the week. If necessary, filth of any description could also be destroyed in this way. By reducing the cost of garbage removal, a crematory would probably pay for itself in one or two years.

Upon the recommendation of the Board, the city council ordered a sewer to be laid down on the Wortley road, from Bruce street north the Stanley street. This was very much needed in order to prevent the further pollution of the hillside and flats, and it is hoped that nothing will occur to prevent the completion of the work, before the opening of spring.

The disposal of the city's sewage, other than pouring it into the river, still remains an unsettled question. At the request of last year's Board, Mr. Willis Chipman, sanitary engineer of Toronto, made plans and furnished estimates of the probable cost of a complete system of sewerage for the city, which, as was recommended by me in a former report to the Board, included an intercepting trunk sewer along the left bank of the river, crossing the south branch near York street bridge by means of a syphon, thence to the low lands below the cove, and there destroyed by oxidization on the land. Connecting with this trunk sewer, the separate system of sewerage could be laid down in or along Carling's Creek, which at present drains about two-fifths of the city, and let storm water take care of itself. The disposal of sewage by irrigation is the best method known to modern scientists, and sooner or later the city council will have to grapple with this unpleasant question, and adopt this or some other approved system, other than allowing the sewage to pollute the river.

T. V. HUTCHINSON, M.D.,

Medical Health Officer.

OTTAWA.

Medical Health Officer's Report.

It is satisfactory to note, in the first place, that during the last year the public health has been generally good.

The total mortality for the period comprised in this report, excluding still births, was 983 deaths from all causes, and out of these 502 deaths are reported as of children under five years of age.

This, estimating our present population at 46,500, would give us a death-rate of 21.13 per thousand—a fair shewing.

Owing to the fact that since January, 1892, the Federal Government has given up the collection of mortuary statistics, and due also to the fact that the law providing for the registration of deaths has been, up to recently, almost entirely ignored, and even now is but indifferently complied with, I am unable to give any statistics shewing with any accuracy the general causes of death.

In May certificates the cause of death is not given at all, and in many more it is given by incompetent persons, and consequently unreliable.

This state of things is very much to be regretted, and, I fear, will never be righted unless by legislative enactment compelling cemetery authorities to exact in all cases before burial a certificate of the cause of death, signed by a physician.

With the exception of measles, which, to an unusual degree, contributed to swell our death-roll (an epidemic of this disease having prevailed throughout the city during the last of the winter and spring months), there has been for the last year a decrease in the mortality rate from infectious diseases, as shewn in table here appended.

As regards such forms of these diseases more particularly needing isolation, I with pleasure, record the fact that the law requiring notification of the health authorities is, as a rule, complied with, whilst the public more willingly co-operate with this department in carrying out such measures as the safety of the community demand. The hospitals for the isolation and care of such cases have, beyond doubt, done good service in the past as first constituted; but, owing to the fact that we have always in our midst sporadic cases of different types of infectious diseases which, for the good of all, must be there isolated, they are not now altogether adequate to meet present requirements. Public interest demands that the usefulness of such institutions and appointments should be such as to inspire the utmost confidence to the physician, and the public generally; and it is to be hoped that the council of 1893 will realize their responsibilities in this matter, and see their way clear in giving the hospital authorities such assistance as will enable them to carry out the improvements suggested by me in a report to your Board made on the 26th of July last. The number of cases treated in these hospitals during the year as well as the number of infectious diseases reported to this department, are shown in tables here appended.

As regards typhoid fever and measles, the number of cases reported at the Health Office, I know, does not represent the number of such cases that occurred in the city during the last twelve months, and that, consequently, the figures given here are unreliable and misleading.

The just fears of the possible invasion of this country by Asiatic cholera, an epidemic of which prevailed during last summer and fall in certain European countries, caused the sanitary authorities on this side to prepare for all emergencies against this justly dreaded pestilence. With a view, therefore, of wakening up the public to a proper sense of the pending danger, extra help was given this department, and a house-to-house inspection was made, resulting in a general cleaning up of premises, which, I have no doubt, was largely conducive to the public well-being.

That the past year was marked by satisfactory progress in sanitary improvements is evidenced by the fact that, besides the completing of certain number of drains recommended by the Board of Health of the previous year, 26 sanitary subsidiary drains, recommended by your Board during the year, are, with a few exceptions, now made or in process of completion in the different parts of the city. In connection with this important question of drainage, I regret that the plan recommended by your Board, which would have brought about the connection of the McLeod street drain with the main sewer, and the removal of the nuisance caused by the discharge of the contents of said drain into Baxter's Creek at Elgin street, has failed, with little prospects of relief in the near future in any other way.

For some years past numerous have been the complaints of the offensiveness of the sewer air escaping from the manholes and gratings along the course of the main sewer. With a view of satisfying the complainants and to modify if possible the present mode of ventilation of said sewer during the summer, the services of an expert sanitary engineer were engaged, who, after due enquiry, was to report and recommend whatever improvements were deemed necessary. This report has not yet been presented.

During the past year I have tested 81 samples of milk with the most satisfactory results in the great majority of cases. The supervision exercised by the Health Department over this indispensable article of food has been productive of most beneficial results, and I am confident that the milk supply of Ottawa is to-day equal, if not superior, to that of any city in Canada.

The system inaugurated in 1891 for the removal and disposal of household refuse has been better appreciated during the past twelve months, than during the previous year, and no doubt will yet much improve in effectiveness as its advantages are better understood by the general public. As it is, though not all that could be desired, it has proved a great boon to a very large portion of the community.

The ambulance service during the year has been satisfactorily done by the contractor in charge of both ambulances, who has generally been prompt and prudent in the execution of his work.

For all details of the work of this department specially under the supervision and control of the Sanitary Inspector, I beg to refer you to that gentleman's comprehensive report for the past year.

In conclusion, I desire to express my entire satisfaction with the assistance I received from the Health Office staff in the discharge of the duties devolving upon this department.

Table shewing the death-rate per thousand per annum from infectious diseases during the past two years :—

Time.	Population (estimated).	Diphtheria.	Croup.	Scarlatina.	Measles.	Whooping Cough.	Typhoid fever.	Total deaths.	Rate per 1,000.
1891	45,000	30	14	24	6	7	9	90	1.99
1892	46,500	15	7	4	16	13	13	68	1.46

Table shewing number of cases of infectious diseases treated in hospitals during the year ending 31st October, 1892 :—

Diseases.	Number admitted.	Number discharged.	Number died.	Remarks.
Diphtheria	84	76	8	
Scarlet fever	37	35	2	
Measles	17	16	1	
Totals.....	138	127	11	

Table shewing number of cases of infectious diseases reported at the Health Office during the year ending 31st October, 1892 :—

—	Diphtheria.	Scarlet fever.	Measles.	Typhoid fever.	Total.	Remarks.
1892.....	50	81	40	17	188	

Records of the By-Word Foundling Institution, Bethlehem, for the past year :—

November 1st, 1891	Infants remaining in institution	12	
	Admitted during the year	198	
	Total	210	210
November 1st, 1892	Infants placed during last year	56	
	Died "	140	
	Remaining in institution at the end of year	14	
	Total	210	210

A. ROBILLARD, M.D.,
Medical Health Officer.

Report of Sanitary Inspector.

To the Chairman and Members of the Board of Health ;

GENTLEMEN,—In submitting this report, it gives me pleasure to say that this year shows that vast improvements in drainage facilities have been inaugurated, and in the majority of cases completed. In other respects progress is not so marked ; still, however, the work done will bear favorable comparison with the preceding years.

Complaints.—Table No. 1 shows that a large number of complaints have been sent in during the past year, but in most cases the grievances have been remedied by notice to offenders. In nine (9) cases, however, proceedings in Court were necessary, which, it is to be hoped, may have a salutary effect. The total number of complaints (2,057) as shown in this table, calling for an investigation, gives an average of about six (6) complaints to each working day throughout the year.

In dealing with these complaints from whatever source, a uniform course is pursued. Having ascertained whom is the responsible party, whether the owner, agent or occupant, he is notified of the nature of the evil found to exist, and it is learned whether he will abate the nuisance.

When there is unnecessary delay in attending to the matter, he receives a Statutory notice stating the nature of the complaint and what is required to be done within a specified time, or the law will be enforced. The next step, when necessary, is to issue a summons to appear before the Police Court for infraction of the "Public Health Act." (See Table No. 2, written notices.) •

Privy Vaults.—I would again call your attention to the constant source of danger which continually menaces the population in the privy-vault. This antiquated system should be rooted out.

House to-House Visitation.—374 house to house inspections have been made by the Assistant-Inspectors in the intervals of their other duties, and as often as the exigencies of other work would permit. In this way, many nuisances have been discovered which might otherwise have escaped detection.

Removal of Garbage.—The present system for the removal of garbage, although an improvement on the past, is not an entire success. The contractor for this work is so surrounded with difficulties that it is almost at a loss he is carrying out his contract. He cannot collect moneys, where he is refused payment, without recourse to the Division Court, and for sums varying from 20 cents to \$1. This is an expensive process, and the time lost in carrying out such prosecutions, is worth more than the sums involved. Again, he has not the entire control of the removal of garbage. Outsiders are permitted to take contracts to cleanse banks, hotels and other large public buildings, and in many cases shops and private residences. His contract (to be worth anything) should be so framed as to shut out all others, excepting those having horses of their own, and willing, under a permit from the Health Officer, to remove their own refuse.

In conclusion, I have much pleasure in testifying to the satisfactory manner in which the Assistant-Inspectors have performed their duties during the past year.

Table No. 1—Classification of nuisances reported to the Department during the year :—

Description of nuisance.	By whom reported.					
	Sanitary Staff.	Tenants.	Neighbors.	Owners.	Others.	Total.
Accumulations of manure on premises, etc.	193	7	3			203
do do on vacant lots, streets, etc.	4	4	1			9
do do of stagnant water.	24	17	1	2		44
Cellars flooded and otherwise polluted.	49	133	16	3	3	204
Drain choked ..	10	11	1	3		25
do of defective construction.	62	31	3		4	100
do box ..	31	9				40
do stone.	2					2
do none.	92	30	4	3		129
Dwelling houses unfit for habitation.	5	1			1	7
do dirty and unwholesome.	8		3	2		13
do sewer gas escaping into.	41	50	1	6		97
do illuminating gas escaping into.	2	5	34	1		9
Foul yards and premises.	616	15	9			659
Privies of defective construction.	138	91			4	248
do none ..	16	3	17			19
Pigs kept too near dwellings.	12		2		1	30
Sinks untrapped ..	6	18				26
do otherwise defective.	17	4			1	22
do none ..	2	4	2			6
Stables too near dwelling.	9					11
Soil-pipes unventilated.	19	2				21
Waste-pipes of defective construction.	57	14			2	73
Water-closets do ..	23	19				42
Water supply defective.	1	4				5
Miscellaneous ..	7		6			13
Totals	1,446	429	132	28	22	2,057

Table No. 2—Statutory notices issued in connection with the foregoing Table :—

Time.	Notices.				Total.
	To tenants and others.	To proprietors.	Written.	Verbal.	
November, 1891	41	71	38	74	112
December "	27	20	23	24	47
January, 1892	21	24	22	26	45
February, "	24	6	19	11	30
March, "	27	40	24	43	67
April, "	24	251	35	240	275
May, "	68	129	56	141	197
June, "	63	122	65	120	185
July, "	31	146	35	142	177
August, "	87	154	74	167	241
September, "	79	146	93	132	225
October, "	65	37	53	49	102
Total	557	1,146	537	1,166	1,703

Table No. 3—Location of Nuisances as shewn in Table 1.

Street.	No. of Nuisances.	Street.	No. of Nuisances.
Albert	43	Isabella	1
Alexander	3	James	3
Anderson	3	Kent	27
Ann	6	Keefer	2
Augusta	12	King	25
Arthur	1	Lisgar	37
Bank	33	LeBreton	5
Bay	13	Rideau	36
Bell	30	Rose	5
Besserer	29	Redpath	3
Bridge	34	St. Andrew	42
Bolton	17	St. Joseph	26
Botelier	2	St. Patrick	46
Broad	13	Sparks	46
Britannia	10	Stewart	7
Balsam	4	Sophia	1
Cambridge	16	Sussex	27
Cathcart	12	Somerset	15
Cartier	1	Slater	16
Cedar	6	Sherwood	14
Church	26	Spruce	1
Concession	10	Lewis	4
Cobourgh	12	Lochiel	1
Canal	3	Lloyd	4
Cumberland	39	Lyon	6
Clarence	77	Lorne Ave	33
Cooper	13	McGee	2
Creighton	11	McLaren	6
Charlotte	1	McDonald	2
Parliament	1	McDougal	2
Portland Ave	1	McLeod	7
Peter	2	McKay	20
Primrose Ave	3	McTaggart	5
Percy	9	Maria	40
Pinard	1	Murray	26
Pine	7	Maple	4
Pine, N.E.	1	Metcalfe	9
Preston	13	Middle	12
Poplar	4	Mosgrove	2
Perkins Ave	2	Martineau	4
Queen	34	Munroe	2
Queen West	6	Market Square	1
Rochester	22	Market By Ward	5
Chapel	2	Nelson	31
Currier	1	Nepean	30
College Ave	2	Nicholas	17
Charles	1	Notre Dame	16
Cliff	1	Ottawa	35
Daly Ave	10	Oregon	5
Dalhousie	55	O'Connor	10
Division	33	Stanley Ave	4
Duke	19	Theodore	6
Elgin	11	Turner	4
Eccles	3	Victoria	6
Elm	5	Water	29
Ellen	6	Waller	11
Friel	9	Waverley	2
Frank	6	Wellington	73
Florence	6	Wilbrod	8
Flora	3	Willow	2
Gloucester	54	York	19
George	4	Other places	5
Grove	4		
Head	2		
Hill	5		
		Total	1,703

Table No. 4—Privy Vaults emptied during the year and the Revenue derived therefrom.

Time	Upper Town.		Lower Town.		Total.	
	No. of Privies.	Amount.	No. of Privies.	Amount.	No. of Privies.	Amount.
1891.		\$ c.		\$ c.		\$ c.
November.....	151	211 41	161	196 45	312	407 86
December.....	134	179 15	241	313 50	375	492 55
1892.						
January.....	178	265 61	261	331 87	439	597 48
February.....	238	328 90	270	384 60	508	713 50
March.....	278	378 10	211	303 40	489	681 50
April.....	202	280 90	180	249 60	382	530 50
May.....	165	243 05	67	102 40	232	345 45
June.....	98	137 58	58	58 30	156	195 88
July.....	66	106 30	27	36 00	93	142 30
August.....	55	69 10	34	45 70	89	114 80
September.....	123	206 00	100	113 25	223	319 25
October.....	150	228 90	152	200 90	302	429 80
Total.....	1,838	2,634 90	1,762	2,335 97	3,600	4,970 87
Average.....						1 38

All of which is respectfully submitted,

GEO. McNEILL,

Sanitary Inspector.

STRATFORD.

Medical Health Officer's Report.

The total number of deaths for the year is 109, showing, on a basis of 10,000 population, a death-rate of 10.9 per thousand.

The number of deaths from contagious diseases was remarkably small.

Thirty-two cases of typhoid fever were reported, with 2 deaths.

Of scarlet fever 43 cases were reported with 3 deaths.

Diphtheria—8 cases were reported with 2 deaths. By prompt attention to isolation and disinfection, the cases were confined to three houses where they first appeared. The cause in the first case was due to exposure of clothing infected some months before; in the second case, the disease was brought here from Owen Sound; and in the 3rd was due to defective drainage.

Measles have been more prevalent than any other contagious disease. As in many cases of this disease, no physician was employed, it is impossible to arrive at an estimate of the number of cases. Only one death from this disease has been reported.

Milk supply.—95 samples of milk have been examined, and the quality in nearly all found good. With our present milk-testing apparatus an accurate analysis cannot be arrived at. I would strongly recommend the purchase of a “Babcock” tester by the city.

Water supply.—Over 120 samples of water from wells in the city were examined and of these, I found 60 per cent. bad. In many cases the bad quality of the water was no doubt due to the amount of “surface” water which washed into wells during the hot weather in early summer.

While the majority of householders showed great willingness to put and keep their premises in sanitary condition, a few required to be constantly looked after by the Sanitary Inspector. I regret to say, that some of the worst offenders in this direction, are to be found among the business men of the city, who persist in polluting the lanes and yards in rear of their places of business. Many cellars under business blocks were also found to be badly drained, and containing an amount of garbage and stagnant water. In all cases these were ordered cleaned at once.

As to present sanitary requirements of the city, I would recommend :—

1. More frequent flushing of sewers and open drains.
2. An improved scavenger system.
3. Carrying out as soon as possible, the construction of a proper system of sewers.
4. Furnishing the city with a pure water supply.
5. Cleaning and straightening the bed of the Avon, from the dam to the western boundary of the corporation, in order to facilitate drainage and prevent accumulation of filth therein.

With these improvements, I feel satisfied that Stratford would continue in the future as she has in the past, to be one of the healthiest cities on the continent.

D. D. ELLIS, M.D.,
Medical Health Officer.

ST. CATHARINES.

Chairman's Report.

It is a pleasing duty to state, that the city has enjoyed its usual good health.

A statement from the City Clerk, showing the number of deaths from all sources is hereto annexed, being 172.

To arrive at the city death-rate from ordinary diseases, I deduct the following deaths as per City Clerk's statement :—Still-born 18, accident 3, burned 1, old age 11, drowned 3, making in all 36 deaths not chargeable to any disease, leaving 136 deaths during the year from various diseases as per clerk's statement, showing a death rate of 13.6-10 per 1,000.

Deaths from typhoid, 4 ; from diphtheria, 1.

The privy vault, as usual, is the most difficult matter we have to deal with. It is to be hoped dry earth closets will gradually come into general use. I am afraid our scavengers are not doing the work as efficiently as it should be done, and closets are not being properly disinfected, which is as necessary as it is to have them cleaned.

The flushing of sewers is considered of very great importance, and it is to be hoped some arrangement can be made to have this done at stated intervals. With our very efficient water-works, it should be an easy matter to accomplish, and without paying the exorbitant sum named by the Water-Works Commission of \$10 for each flushing. At that rate, to do the work properly, it would cost \$500 per year.

It is to be regretted, that the city council did not act upon the recommendation of the Board *re* appointing of an assistant inspector for a short season. If this had been done a very large amount of work would have been performed, and the city placed in a wholesome sanitary condition.

It is to be hoped the council will, in future, act upon the advice of gentlemen whom it appoints to look after the health of the city, as they have nothing but the best interests of the city at heart.

SAML. G. DOLSON,

Chairman.

ST. THOMAS.

Medical Health Officer's Report.

During the year 1892 the number of deaths from all causes was 92. Deaths from preventable diseases have been—from whooping cough, 2 ; typhoid fever, 4 ; scarlet fever, 3 ; and diphtheria, 2.

The card system has been the means of preventing the spread of zymotic diseases to a considerable extent.

The epidemic of scarlet fever has been prevalent for the entire year. I noticed that the disease would be suspended for some time, and then in certain school sections it would break out again, showing that the necessary preventative of thorough cleanliness and disinfection had not been adopted. The spread of the disease was undoubtedly due to the children attending school, in clothes worn by them during the time of the disease or its convalescence.

As the present system, from carelessness or want of knowledge, is ineffectual, it is important that the city should establish a proper place for the thorough cleansing and disinfection of all clothing and bedding worn or used by persons or families during the time of fever.

The number of houses placarded during the year of 1892 was—for scarlet fever, 104 ; for diphtheria, 19 ; for measles 4, which had expended its force during the previous year.

We have now over eight miles of brick and tile sewers in good working order.

Previously to the sewerage system there were quite a great many deaths from typhoid fever. Since that time all contagious diseases have been of a milder type, and typhoid fever, since the construction of this sanitary work, has gradually disappeared.

There are now over 400 closet connections with the sewer. It is the desire of the Board of Health that all persons living in the vicinity of sewers should use them. It is the intention of the Board of Health to urge on the council the necessity of passing a by-law to compel every person so situated to do away with privy pits and have water closets connected with the sewer.

Owing to a mistake made in the construction of our main sewer it will be necessary to put down another trunk sewer about a mile in length for the purpose of draining the entire city.

We have an abundant supply of excellent water, filtered by means of the Hyatt system of filters, although not equal to spring water that might have been conveyed to the city in iron and tile pipes at a less expense, such as Woodstock and London have availed themselves ; yet the supply is abundant, and is forced through twenty miles of pipes to all parts of the city, enabling us to flush every sewer.

It is the intention of the Board to advise the council to cause all public lavatories to have sewer connections.

We have erected a building in one of the most picturesque parts of the city, away from all residences, for the purpose of isolating diseases such as small-pox or cholera should they make their appearance.

We are gradually doing away with our mud roads and substituting good gravel and broken stone, so that during every rain storm they may be cleaned.

The population of St. Thomas is 10,812 ; number of deaths from all causes for year 92, giving us a death-rate of .85.

WM. C. VAN BUSKIRK, M.D.,

Medical Health Officer.

WINDSOR.

Medical Health Officer's Report.

Scarlet fever and diphtheria have been very prevalent during the past year. Measles and whooping cough have also been epidemic, but with the exception of diphtheria all have been mild and the death-rate low.

As the Dominion Government has withdrawn the subsidy for collecting vital statistics I cannot give the usual mortuary summary.

The following is from the records of the Health Officer : Scarlet fever, 112 cases, 4 deaths ; diphtheria, 81 cases, 19 deaths, the mortality of the former being $3\frac{1}{2}$ per cent. and the latter $23\frac{1}{2}$ per cent.

Scarlet fever has been more difficult to isolate this year on account of its mild form, many cases escaping notice until exfoliation took place.

Diphtheria as usual has done its deadly work, mostly in houses with damp cellars, and where unhealthy conditions existed under and around the house. Through the vigilance of the Inspector these conditions have been greatly improved and in another year will have almost disappeared.

The usual cleaning up was done in May. The Inspector's books show that 569 loads of refuse and garbage were removed at a cost of \$294.07 ; that officer also reports 785 privy vaults were cleaned and the contents amounting to 3,648 barrels removed

Fifty sewer connections have been made during the year and as many vaults filled up, besides a large number of new connections have been made on the streets where the connections were put in when sewers were constructed.

Cholera Precautions.—Application to the city council for special grant of \$500 met with a prompt compliance, and a general cleaning-up circular was issued, although at that time the city was never before so clean, yet when everybody set to work to dig out corners hitherto overlooked, a vast amount of fertile material for the development of disease germs was carted away and its bed rendered harmless by the liberal use of disinfectants.

Arrangements were made with the three railways to keep a car near the station should the disease develop on the trains.

An ambulance was kept in readiness to remove the cases promptly and tents were bespoken which could have been erected on a few hours' notice. Nurses were also bespoken, and as far as necessary the situation was anticipated.

The State of Michigan proclaimed a quarantine against all passengers landing in the St. Lawrence and against those coming from New York as well. The city of Detroit did the same, and sent inspectors to examine passengers on their arrival here, and the consequence was that trains of immigrants were delayed for days in the railway yards. These people were left without food except such as the railway authorities and the charitably inclined furnished, and they drank water full of sewage along the docks or out of the ditches when the cars were sent to the rear of the city. For a time this treatment was only accorded to third-class passengers but later first-class passengers coming by steamers carrying no steerage passengers were subjected to the same treatment and they were ordered into quarantine for 20 days by these inspectors, with an air of authority, which, owing to their ignorance of the ways of the country and their defenceless condition, they accepted it as a culprit receives his sentence from a judge.

This inspection is still going on at Windsor, Point Edward and the Soo, and unless something can be done to prevent, it is liable to continue for years to come. It is almost certain to develop epidemics in Windsor which otherwise would never have reached us, and inasmuch as Michigan has made no preparation as to quarantine grounds, or appliances for the disinfection the effect is neither scientific, protective, humane or intelligent. In fact it savors of the same spirit which actuated the inhabitants of Fire Island where defenceless passengers were denied the necessities of life and threatened with shot guns. If the Michigan Board of Health expects the co-operation from Ontario to protect the State of Michigan from disease they will never accomplish that end by erecting a breeding bed for it in Windsor, and their inspectors must cease to practice their insufferable methods. This is a clear case where the inspector has been to Windsor a greater nuisance and a greater source of danger than the disease they sought to combat.

Water.—I am happy to be able to report progress on the question of a purer water supply which has been the subject of much solicitation on the part of the inhabitants and also the theme of much acrimonious correspondence. Analysis after analysis made last year and this has so conclusively demonstrated the presence of sewage in our water, that the water commissioners engaged Mr. Chipman, C.E., to examine and report on the subject.

This report has not yet been sent in but I have no doubt it will result in giving us a purer supply, at a very moderate outlay of money. The water may still be muddy at times, but it will be minus the contribution of the Walkerville sewers.

Sewerage.—The Michigan Central Railway Company continue to pump the sewage of Windsor as a water supply to their employees and passengers despite the notification that the Board will proceed against them. The fact that much sickness has prevailed among their employees this year and a notably high proportion of typhoid fever has occurred among them would seem to warrant this Board in issuing an injunction restraining the company from using this water.

On the 13th September a Committee of this Board inspected a number of livery and boarding stables and reported a shocking state of things. After receiving the report and passing a resolution to deal with them the Inspector served them with notices, but with one exception these notices were ignored. The same conditions as these exist and the health of those living in the vicinity is endangered by these nuisances.

I have made a number of milk inspections during the year, and found nearly every sample up to the ordinary standard.

The crowded condition of our schools, and the reopening of an old building which had been condemned demands increased accommodation immediatly.

The need of a contagious disease hospital has been fully demonstrated this year, and the council appointed a committee to confer with this Board on the matter. I have been in daily expectation of receiving plans from the Provincial Board of Health but they have not reached me. Besides the hospital a disinfecting apparatus is absolutely necessary in order to destroy contagion in clothing, as the present methods are very unsatisfactory.

Mr. Grieves, the Inspector, has again done excellent work and his report shows not only a vast amount of cleaning up, but owing to his careful oversight the work was done very cheaply.

JOHN COVENTRY,
Medical Health Officer.

TOWNS.

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, Scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night soil.
Barrie	The provisions of the Health Act have not been conformed with by some, and faulty sanitation exists in residential parts of town.	All wells in certain sections of town were ordered to be filled up.	Isolation and disinfection adopted in these diseases. M. H. O. points out the responsibility that rests upon all Local Boards in preparing to resist cholera should it make its appearance in the country.	D.—Several cases. T.—A few cases. S. F.—4.	.....	.....	All privies were ordered to be abolished in certain parts of town. Regular removal of contents of earth closets has been effected.
Bowmanville.	M. H. O. remarks that in view of visitation of cholera, citizens showed individually endeavor to keep town in a good sanitary condition.	Drinking water used believed to be of good character.	.....	D.—6. T.—3. S. F.—4.	.....	.....	Only two places reported in an unsanitary condition, etc., nuisances were removed.
Bracebridge.	The Board was energetic in looking after anything detrimental to public health.	.....	The spread of diphtheria largely due to want of proper precautions in first cases.	D.—No. of cases. T.—1. S. F.—A few cases.	.....	.....	.....
Brampton	A set of rules prepared by chairman published <i>re</i> disinfection, etc.	.....	.....	D.—1. S. F.—Cases.	.....	.....	Garbage properly disposed of.
Brockville	The town has been put in good sanitary condition. M. H. O. recommends strict regulations as to cutting of ice.	Water supply has had the serious consideration of Board. The public wells have been closed, being sources of danger to community.	An isolation hospital has been erected and ready for use at a moment's notice. Typhoid traceable to well water.	D.—1. T.—A number of cases. S. F.—A number of cases.	Many streets without sewers, and many houses on sewer streets not connected.	The keeping of pigs prohibited within certain limits of municipality. Slaughter-houses inspected and milk regularly tested.	A large number of pits cleaned, and all garbage properly disposed of.

Chatham	An additional sanitary inspector was appointed and a thorough cleaning up of the town took place. Schools received attention.	The water supply reported by M. H. O. to be excellent.	Isolation, placarding and disinfection D.—17. T.—8. S. F.—25.	A more perfect sewer system about to be constructed. Council asked to pass a plumbing by-law and appoint an inspector of plumbing.	
Cobourg.....	M. H. O. recommends that every means should be taken to put the town in a good sanitary condition against the possible invasion of cholera.	Drinking water found in some cases to be impure.	Strict attention paid to placarding isolation and disinfection in infectious diseases. D.—13. T.—28. S. F.—2.	A number of sewers and ditches were constructed.	Slaughter-houses found in a satisfactory condition on inspection.
Collingwood..		Water supplied pronounced good.	..... D.—3. S. F.—A few cases.	No regular system of drainage.	Council passed a by-law prohibiting privy pits in central portion of town.
Dresden.....	A careful inspection of town made by M. H. O. Two complaints came before Board.		..... T.—3. S. F.—1.		Privy pits found to be a fruitful source of disease and their abolishment recommended.
Dundas	House to house inspection made as well as inspection of water closets, barns, etc. One house destroyed because of its filthy condition by order of council.	Abandonment of well water shows greater freedom from diseases attributable to contaminated water.	Placarding adopted in infectious diseases. The Board purchased coppers and distributed it freely to householders. T.—1. S. F.—1.		Water closets were cleaned and all garbage properly disposed of.
Fort William.		Water supply is from Kamistiquia river and fairly good.	..... T.—3.		The nuisance ground is one and one-half miles from the town, and one-half miles from any dwelling is well adapted for the purpose.

TOWNS.—Continued.

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Galt	House to house inspection made, as well as all schools, factories, etc.	A number of wells inspected, where water found bad orders given to close well.	.....	.....	.....	.....	The removal of nuisances properly attended to.
Ingersoll	All milk vendors compelled to register, and inspection of dairies and testing of milk was made. The schools were inspected and the well-water at central school condemned, the well was closed.	The sources of the water supply should have better protection from cattle, and removal of all fallen wood along supply stream recommended.	..... D.—1. T.—1.	.....	.....	Slaughter-houses have been well kept, and the management of a pork-packing establishment has exercised much care in keeping the surroundings in a sanitary condition. The keeping of hogs in thickly settled parts of town should be prohibited at all times.	The removal of night-soil to dumping pit out of town limits efficiently performed under supervision of Board. All engaged in removal required to register and pay license fee. It is recommended by Board that privy pits be abolished and dry-earth closets substituted.
Kincardine ...	A large number of yards inspected. All garbage removed where found.	Some wells closed.	A severe epidemic of diphtheria extending over five months.	D.—70. T.—2.	.....	.....	Board intends to substitute dry earth closets for privy pits where possible.
Lindsay	Some cattle affected with actinomycosis slaughtered and meat offered for sale.	An efficient system of water-works constructed.	Precaution taken to prevent spread of infectious diseases.	D.—6. T.—1. S. F.—12.	The construction of a system of sewerage under way....	Careful inspection of slaughter-houses and dairies made.	The cleaning out and disinfecting of privies neglected in many cases.
Meaford	Householders were notified to put their premises in a sanitary condition.	.....	A fine was imposed on one person for exposing clothing, etc., from a house in which diphtheria existed.	.....	.....	.....	Council was urged to do away with privy pits.

Milton	The Board desires to acknowledge the assistance given by the physicians of the town during the year.	.....	Placarding and other necessary precautions taken to prevent spread of infectious diseases.	D.—A few cases. S. F.—2.	.....	.....	An isolated plot of ground secured for deposits of night-soil and garbage.
Narance	The council backward in seconding the efforts of Board of Health to put town in a good sanitary condition, the recommendations of Board treated with greatest indifference by it.	Water supply of town generally bad.	Free from infectious diseases.	T.—Some cases.	.....	.....	.....
Newmarket ..	A thorough inspection of town was made, some complaints made to the Board were dealt with.	.....	Isolation and disinfection used to prevent spread of infectious diseases.	D.—26. T.—2. S. F.—2.	.....	.....	Many privy vaults so constructed as to be difficult to clean. Board recommends that the trouble be dealt with by the council.
Niagara	House to house inspection made, and all existing evils ordered to be removed.	Recommended that all open wells be filled in. Water from water-works excellent in quality	.....	.....	All open drains have been cleaned. It is ordered that all cesspools should be cleaned.	Slaughter-houses to be removed outside of town limits, and dry earth closets substituted.	It is recommended that all privy vaults be filled in and dry earth closets substituted.
North Toronto	Good sanitary condition of town attributed to the efforts of the sanitary inspector. Children in certain district prohibited from attending school owing to diphtheria.	A system of water-works established and water supplied found to be good.	Diphtheria most prevalent in part of town adjacent to night-soil dumps, etc. abatement of nuisance was attributed abatement of disease which followed. Isolation of much value in limiting spread of disease.	D.—45. T.—5. S. F.—3.	.....	Slaughter houses reported well kept.	Board asked Township Board to prohibit night-soil being deposited within half mile of town limits. Some filthy closets were ordered to be cleaned and disinfected.
Oakville, .....	.....	.....	Diphtheria very rare.	S. F.—2.	.....	.....	.....

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Owen Sound..	Milk supplied found on analysis to have a fair average. M. H. O. regrets that as clean a bill of health cannot be reported as in two former years.	.....	Spread of diphtheria due to children attending school from a affected houses. Placarding, disinfection, etc., found necessary to check spread of disease.	D.—75. T.—6. S. F.—17.	About one-half mile of sewer pipe laid during the year.	.....	M. H. O. remarks that one of their greatest difficulties is the irregular manner in which night-soil is disposed of; he recommends the regular removal of all garbage.
Paris	A thorough inspection of yards, etc., made by sanitary inspector. The M. H. O. recommends that the milk sold be tested.	Analysis of water shows it to be first-class.	The attendance at school of children in whose homes scarlet fever existed had much to do with spread of disease.	D.—1. T.—2. S. F.—24.	A number of sewers have been constructed during the year.	No animals slaughtered within town limits. Pig-pens kept properly. Complaints made against C. T. R. shipping yards.	Some difficulty experienced by householders in getting night-soil removed, an organized plan for removal of it and garbage recommended.
Parry Sound..	On inspection many of the schools were found poorly ventilated, the lighting and heating also defective in some.	A system of works that is giving great satisfaction has been constructed.	Free from infectious diseases.	.....	.....	.....	The sinking of any more privy pits was forbidden, and dry earth closets ordered instead.
Pembroke	House to house inspection with notice to householders to remove all garbage forthwith.	Water supply bad in six places. Privies too near wells. An abundant water supply.	Precautions taken in infectious diseases.	D.—2. T.—19. S. F.—2.	Many cellars wet and undrained. A perfect system of sewerage.	Only one slaughter-house within town limits, precautions taken to keep it in a passable condition.	Nuisances in the form of manure heaps, privies, etc., abated. Some dry-earth closets in use.
Perth	Inspector has inspected streets, yards, etc.	.....	Free from infectious diseases.	.....	Very little drainage exists, much is required.	.....	Manure from cow byres properly disposed.

Peterboro'	M. H. O. recommends that every precaution should be taken to prevent cholera should it appear in the country.	Water-works system giving satisfaction.	Precautions taken to prevent spread of these diseases.	T.—6. D.—1	A system of sewerage contemplated.	No complaints made re slaughter-houses. A pork packing establishment declared a nuisance and abated.	Garbage properly removed under an organized system.
Petrolia		A system of water-works contemplated.	Placarding and isolation used to prevent spread of infectious diseases.	T.—2. S. F.—Cases.			Garbage, etc., removed under direction of inspector.
Pictou	M. H. O. recommends that vaccination should be neglected much more generally enforced.	All doubtful wells should be closed. Ice supply regulated by Board.	Only two isolated cases of infectious diseases.				The M. H. O. states that the abolition of privy pits should be insisted on, and suitable ground provided for deposits of night-soil.
Port Arthur			Every place which was infected efficiently and thoroughly disinfected.	T.—1. S. F.—2.			
Port Hope	Ice from Beamish Pond inspected and pronounced pure. Town inspected.						
Sandwich	In view of an advent of cholera, council passed a by-law so as to secure better sanitation.	No night-soil to be deposited within 50 feet of any well.	Isolation, etc., adopted, in infectious diseases.	D.—A few cases.			Regulations forced re cleaning of privy vaults before 1st of May in each year. Immediate disinfection after cleaning. Regular removal of all garbage.
Seaforth	A thorough cleansing of all back yards was made, which had the effect of preventing sickness.		Comparatively free from infectious diseases.	T.—A few cases.			Some difficulty found in getting a deposit ground for garbage, etc.
Simcoe	M. H. O. recommends a house to house inspection in the spring.		Precautions taken to prevent spread of these diseases.	D.—5. S. F.—A few cases.	M. H. O. recommends that more drainage be constructed.		Some complaints re odors from a canning factory. M. H. O. urges that all privy pits be done away with.

TOWNS.—*Concluded.*

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Strathroy	Much attention was given to sanitary condition of town, every possible measure for abating nuisances was adopted.	.....	Diphtheria mentioned as being of a malignant type.	D.—5. T.—Cases. S. F.—Cases.	.....	Slaughter houses on inspection found generally in good condition. Some pig-pens found to be a nuisance.	Night-soil deposits complained of by persons living in vicinity of deposit trenches. Board urged to purchase suitable grounds for night-soil deposits.
Tilsenburg ...	Sanitary condition of town satisfactory.	.....	Prompt measures were taken to prevent spread of these diseases.	T.—A few cases. S. F.—“	.....	.....	.....
Trenton	Majority of the people pay little attention to orders of Board of Health. The cleanliness of the streets should be better looked after.	.....	Energetic measures adopted to prevent spread of diphtheria. M. H. O. urges that the town be put in a good sanitary condition in case cholera should appear.	D.—20. T.—A few cases.	.....	.....	Four hundred privy pits found on inspection in a filthy condition. M. H. O. thinks that if proper steps are taken much can be done towards abolishing privy pits. A scavenger should be appointed to look after regular removal of night-soil and all garbage.
Walkerton ...	Health of community in a satisfactory condition.	.....	.....	D.—A few cases. S. F.—“ T.—“	The drainage of the town into the Saugeen river causing some trouble.	.....	.....
Walkerville ..	House to house inspection made in spring of year, as well as when cholera threatened to reach the country.	.....	Diphtheria spread because of want of notification in first cases. Isolation enforced to prevent spread of the disease.	D.—25. S. F.—14.	.....	.....	The lanes were regularly cleaned and all refuse removed.

West Toronto Junction ..	Dailymen's' premises under supervision of Board.	M. H. O. reports a splendid system of water supply.	Placarding and exclusion of children from school houses where infection exists adopted to prevent spread of infectious diseases.	A system of sewerage under construction.	.....	Garbage, etc., properly disposed of under direction of sanitary inspector. Also night-soil.
Whitby ...	Many nuisances inimical to health abated.	.....	M. H. O. reports much illness during the year.	.....	.....	.....
Windsor	Owing to the probable advent of cholera \$500.00 was specially granted by council for a thorough cleaning up of town. An ambulance for removal of cholera patients was in readiness should disease appear, as well as tents for reception of them. Milk tested found nearly up to standard.	M. H. O. reports progress on the question of a pure water supply. M. C. Ky. Co'y. has pumped the sewage of Windsor as a water supply to their employees and passengers, causing much typhoid among them, after being notified to desist.	Diphtheria most deadly in horses with damp cellars and where unhealthy conditions existed under and around the house. Through vigilance of inspector these conditions have been greatly improved. M. H. O. remarks that the need of an infectious disease hospital fully demonstrated this year. Also a disinfecting apparatus for clothing, etc.	Fifty sewer connections were made during the year.	Some livery and boarding stables in a very filthy condition, causing an intolerable nuisance.	Garbage and refuse properly disposed of. Also contents of many privy vaults.
Woodstock ..	Literature relative to sanitary matters distributed. House to house inspection made. An inspection of dairies and their stables was made which will result in much good both to vendor and consumer. A milk tester was purchased.	The number of water services have been increased, and they have been introduced into the schools.	School teachers were requested to allow none to attend school who were exposed to infectious diseases without certificate from physician. An infectious diseases hospital needed.	M. H. O. recommends the grading and draining of lanes in rear of business places, the want of such injurious to health of citizens.	.....	Seven hundred dry earth closets in use and fifteen privy pits were closed up. A suitable dumping ground for garbage much needed. M. H. O. recommends that a scavenging department be organized for removal of night-soil and garbage.

VILLAGES.

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Ailsa Craig.....	.....	.....	Free from infectious diseases.	.....	.....	.....	All privy vaults are cleaned out in spring and disinfected.
Allandale.....	Village believed to be in a good sanitary condition.	.....	All causes that were likely to favor typhoid were removed.	T.-2.	.....	.....	.....
Alvinston	Board not so energetic as in former years.	Wells not properly looked after.	.....	D.-A few cases. S. F.—A few cases.	.....	.....	Water closets require more attention.
Annersburg.	House to house inspection twice made during year.	A system of water-works has been constructed.	.....	S. F.—2. T.—4.	.....	A piggery nuisance abated after much trouble.	Garbage from Detroit dumped in river prevented by heavily fining offender.
Beansville....	House to house inspection made, and premises found in a cleanly condition.	.....	Placarding notices sent to schools to prevent spread of diphtheria, and diseases confined to first cases.	D.—3.	Three drains found in a bad condition and repaired.	.....	.....
Beaverton....	Increased efforts of Board has had a marked effect on the public health.	.....	Free from infectious diseases.	.....	.....	.....	Close attention has been given to the cleaning of water closets and removal of all garbage.
Blyth	Inspector made an inspection of village and caused all premises to be put in a cleanly condition.	.....	.....	D.—2. T.—3.	An excellent system of drainage in operation.	.....	.....

Bolton	Isolation adopted in D.—4. diphtheria cases.			One slaughter-house nuisance remedied to some extent.	Some deposits of night soil complained of. Some privy pits emptied and disinfected.
Brussels		Danger to wells from privy vaults.	M.H.O. suggests that all infectious cases of diphtheria be reported by physicians.	Some hog pens and stables too close to public streets.	M. H. O. urges the adoption of the dry earth system of closets, and the abolishment of privy pits.
Burlington	An inspection of all water closets, lanes, etc., made by inspector.			One slaughter-house needed attention.	
Cannington	A thorough cleaning of all streets, yards, etc., under direction of inspector was made.	Water supply from wells generally good.		A system of drainage is contemplated.	Privy vaults have been cleaned yearly and disinfected. Council has passed a by-law abolishing privy pits and substituting earth closets instead.
Chesley	Inspector made careful inspection of village.	Most of the wells were cleaned out.	Free from infectious diseases.		The yards of two parties found in a dirty condition but remedied on notification.
Colborne	General health of community good.		The schools were closed and disinfected for purpose of stamping out diphtheria.		
Deseronto	One case before Magistrate for non-compliance with order of Board.		Comparatively free from infectious diseases.		Board ordered filling up of all privy pits and substitution of dry earth closet.
Dundalk	Board made inspection of village during the year. Citizens readily respond to work of Board.				

VILLAGES.—Continued.

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Dunnville .....	.....	Two wells containing impure water were filled up, and many more are suspected.	.....	T.—9. S. F.—5.	.....	.....	Council passed a by-law to abolish privy pits.
Elora	In view of probability of cholera visiting Canada next summer and all surface filth thorough cleanliness is enjoined on all.	The necessity of having all well cleaned and all surface filth removed is pointed out.	Free from infectious diseases	.....	.....	.....	Chairman recommends that privy pits be abolished and dry earth system introduced.
Erin	Places requiring attention were thoroughly inspected.	.....	Means were taken to prevent spread of infectious diseases.	D.—4.	.....	.....	.....
Exeter	All householders notified to put their premises in a cleanly condition.	.....	Comparatively free from infectious diseases.	.....	.....	.....	.....
Fergus	Regular inspection of yards and outbuildings made.	The wells in many places looked upon with suspicion because of proximity to privy vaults.	.....	D.—1. S. F.—1.	.....	.....	The dry earth closet system strongly recommended, with regular systematic removal of contents, and abolishing of all privy vaults.
Forest .....	.....	Wells regularly cleaned.	Precautions taken to prevent spread of infectious diseases.	S. F. cases.	.....	.....	Night-soil properly disposed of.
Hastings	Everything was done to keep village in good sanitary condition.	Public wells were cleaned out.	.....	.....	.....	Hog pens, etc., looked after.	Privy pits were cleaned.
Lakefield	No complaints made during year.	.....	Free from infectious diseases.	.....	.....	.....	Inspector reports everything clean and well kept.

Leamington	.....	.....	.....	Comparatively free from these diseases.	.....	.....	One pig pen found too near a dwelling.	Nuisances in the form of manure heaps and offal from slaughter-house abated.
Lucan	Nuisances promptly abated.	.....	.....	Placarding in infectious diseases.	.....	.....	.....	.....
Markdale	M. H. O. draws attention to advisability of erecting cemetery outside of village limits because of dangerous proximity of present one to wells and residences.	.....	.....	M. H. O. points out in view of probability of cholera the necessity of Board being vigilant in sanitary matters.	D. — A number of cases.	.....	.....	.....
Merritton	A thorough inspection of all premises made by inspector.	.....	.....	.....	D. — 1. T. — 1.	.....	.....	.....
Midland	M. H. O. draws attention to possible advent of cholera.	.....	.....	Through energetic action of Board diphtheria was stopped from spreading.	D. — 2. T. — 3.	.....	.....	.....
Millbrook	Sanitary condition of village good.	.....	.....	Free from infectious diseases.	.....	.....	.....	Closets cleaned out under direction of inspector.
Milverton	Inspector has visited all houses and found them clean.	Well water found of good quality with a few exceptions.	.....	Precautions taken to prevent spread of typhoid. M. H. O. suggests that the law be enforced re the reporting of all infectious diseases.	T. — 2.	.....	M. H. O. suggests that pig-pen in connection with a cheese factory be removed without village limits.	.....
Newboro'	Board active in looking after sanitary condition of village.	.....	.....	Free from infectious diseases.	.....	.....	.....	.....
Newburgh	House to house inspection made.	.....	.....	Free from infectious diseases.	.....	.....	.....	Garbage, etc., promptly removed.
Newcastle	House to house inspection made, and unsanitary conditions removed.	Water supply generally good.	.....	Isolation adopted to prevent spread of scarlet fever.	S. F. — 7.	.....	.....	.....

VILLAGES.—Continued.

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, Scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Niagara Falls Village.....	House to house inspection made by sanitary inspector and, except in a few cases, all premises found in satisfactory condition.	.....	Free from infectious diseases.				
Norwood.....	Householders responded promptly to the call of the inspector to put their premises in a clean condition	.....	Isolation and disinfection adopted to prevent spread of infectious diseases.	D.—A few cases. T.—1.		Slaughter-houses on inspection found properly kept.	M. H. O. suggests that more stringent measures be adopted re disposal of refuse.
Oil Springs...	Several parties fined for neglecting notices of inspector.	.....	Isolation and disinfection adopted in these diseases.	D.—3. S. F.—1.			All garbage, etc., removed to a dumping ground provided for it.
Ottawa East..	Several meetings of the Board were held.	.....	Free from infectious diseases.			Some complaints re pig-pens and slaughter-houses made. Nuisance abated.	Rules adopted for regular cleaning of privy vaults and cesspools.
Paisley.....	Sanitary condition of village satisfactory, and people willing to comply with the Act.	.....	.....	S. F.—2.			One nuisance only reported and remedied.
Pt. Edward...	Notices were given the people in the spring to clean up their premises.	.....	Isolation in infectious diseases.	D.—1. T.—2.			A few nuisances were reported and promptly abated.

Pt. Elgin....	A thorough inspection of all yards, water-closets, cellars, cisterns, etc., made by inspector, and he insisted upon these being kept in a good condition.	All the wells in vil- lage were cleaned before June 1st.	Isolation in infectious diseases.	D.—Some cases. T.—Some cases.	.....	.....	Dry earth closets substituted for privy pits and regular removal of contents.
Portsmouth....	House to house inspection made and all yards, cellars, etc., were ordered to be cleaned.	Water supply from wells.	Free from infectious diseases.	.....	.....	.....	Privy pits still in use, dry earth closets the exception.
Renfrew.....	Vigorous measures were adopted to ensure cleanliness of all yards, etc. Chairman suggests that as early in year as frost will permit all refuse from streets, yards, etc., should be removed in case of appearance of cholera.	.....	Comparatively free from infectious diseases.	.....	.....	.....	Nuisances caused by closets, wash-house, etc., were remedied. The regular removal of night-soil and adoption of dry earth closets are commended.
Southampton.	Sanitary regulations have been well carried out in most cases.	.....	.....	D.—A few cases.	.....	.....	Board passed a resolution that all new closets and replacing old ones must be on the dry earth system.
Stirling	Inspector made regular inspections of village.	.....	Free from infectious diseases.	.....	.....	.....	(Garbage properly disposed of.
Stouffville....	Houses and outbuildings carefully inspected.	.....	The usual precautions taken to prevent spread.	D.—3.	.....	.....
Streetsville, ...	House to house inspection of municipality made. All nuisances complained of abated.	.....	Free from infectious diseases, with exception of one case of typhoid	T.—1.	.....	.....

VILLAGES.—*Concluded.*

Name of place.	General inspection.	Water supply.	Infectious diseases.	Diphtheria, typhoid, Scarlet fever.	Drainage.	Slaughter-houses, etc.	Disposal of garbage and night-soil.
Sutton.....	Inspector made an inspection in spring and fall and urged the necessity of removal of all refuse, etc.	.....	.....	D.-2. T.-1.	Underground drainage suggested to keep cellars dry.	.....	.....
Teeswater.....	A thorough inspection of village made, and any nuisances abated.	.....	Every precaution taken to prevent spread of infectious diseases.	D.-2. T.-1.	.....	.....	.....
Thamesville...	Sanitary condition of village good.	.....	.....	T.-2. S. F.-2.	.....	.....	.....
Thedford.....	.....	.....	M. H. O. thinks the diphtheria due to defective drainage.	D.-11. T.—A few cases.	.....	.....	.....
Tilbury Centre	.....	All wells were attended to.	Free from infectious diseases.	.....	.....	.....	All closets are looked after.
Tweed.....	Yards, etc., looked after by sanitary inspector.	Wells in danger of contamination from accumulations of refuse.	.....	S. F.—A few cases.	Drainage of some low lands effected.	A pig-pen nuisance in connection with a cheese factory abated.	M. H. O. suggests that the disposal of all refuse be looked after more closely.
Uxbridge.....	Chairman of Board thinks the law should be amended giving council power to abolish privy pits.	Organic matter found in well waters 100 feet away from manure heap or cesspool.	.....	T.—A large number of cases.	.....	.....	Board recommends abolition of privy pits. The digging of new ones prohibited.
Vienna.....	Health of community good. No complaints made to Board.	.....	Free from infectious diseases.	.....	.....	.....	.....
Waterford...	General health of community good.	.....	M. H. O. has kept close watch on infectious diseases.	S. F.-2.	.....	.....	.....

Watford,	Public beginning to realize that cleanliness is the best preventive from disease.	Water supply not likely to be contaminated.	.....	.....	Drainage not so good as wished.	A misance in the form of bringing in manure by trains is reported.	M. H. O. recommends the passing of a by-law compelling householders to substitute dry earth closets for privy pits.
Weston	House to house inspection made and a general cleaning up ordered.	.....	Disinfection and isolation used to prevent spread of infectious diseases.	D.—1. T.—4.	.....	.....	.....
TOWNSHIPS.							
Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter houses and pig-pens.
Adelaide	Sanitary inspection made two inspections during the year.	.....	.....	.....	T.—Several cases. S. F.—4.	.....	.....
Albemarle	Sanitary condition of township satisfactory.	Water supply pure.	.....	Fice from infectious diseases.	.....	.....	.....
Albwick	Board active in its endeavors to put township in good sanitary condition.	.....	.....	Typhoid due to privy attached to house, odors from which penetrated every room in the house. Diphtheria thought to be due to pool of stagnant water near house.	D.—1. T.—2.	.....	M. H. O. recommends that all privy pits be thoroughly cleaned and disinfected not later than June, and disinfected at stated intervals thereafter during the summer.
Ameliasburg ..	Vaccination neglected.	.....	.....	Disinfection in infectious diseases carried out carefully.	D.—2. T.—2. S. F.—4.	.....	.....

TOWNSHIPS.—Continued.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever,	Drainage.	Slaughter-houses and pig-pens.
Ancaster	All back yards inspected. Sanitary condition of township good.	.....	.....	.....	T.—5. S. F.—13.	.....	Slaughter houses, etc. inspected, and M. H. O. and inspector saw that they were kept clean.
Ashfield	Only one complaint brought to notice of Board during year.	.....	.....	A close supervision was exercised by the Board throughout the township.	.....	A filthy cesspool nuisance abated by order of inspector.	.....
Barton	Sanitary condition of township improved since establishments for bone boiling, etc., have been done away with.	.....	.....	.....	.....	.....	Slaughter-houses have been looked after regularly.
Belmont, etc.	M. H. O. and inspector made an inspection of village of Havelock. The people are taking a greater interest in the sanitary regulations of the Board.	.....	.....	Free from infectious diseases.	.....	.....	.....
Bentinck	The sanitary condition of township has been well looked after by the inspector.	.....	.....	.....	T.—A few cases.	.....	.....
Blenheim	Board suggests that Rule 7 of Sec. 14, Schedule A, be changed to read "between the first day of April and the first day of November," etc.	.....	.....	A school was closed on account of prevalence of diphtheria; every means taken to prevent spread of disease.	.....	.....	M. H. O. reports that slaughter-house nuisance has been overcome, but the pig-pens have given them trouble.

Brooke.....	Inspector should visit and examine every well used for drinking purposes.	Cheese factories inspected and found in fairly good condition.	Comparatively free from infectious diseases.	T.—A few cases.	.....	One slaughter-house nuisance caused trouble.
Bruce.....	M. H. O. reports township in a satisfactory condition so far as preventable diseases are concerned.	.....	.....	Free from diphtheria and scarlet fever.	T.—4.	.....
Brudenel.....	.....	.....	.....	Every precaution taken to prevent spread of diphtheria.	D.—A number of cases.	.....
Buxford.....	A thorough inspection of township should be made.	.....	.....	.....	D.—1. T.—1. S. F.—6.	.....
Caledon.....	A timely visit of M. H. O. prevented the attendance at school of some non-convalescent scarlet fever cases.	An open stream from which drinking water is taken, and to which cows, pigs and geese have access, believed to be the cause of some diphtheria cases.	.....	M. H. O. says because of knowledge of sanitary laws, though infectious disease do occur, their speed is checked. Physicians reporting those diseases better than in other years. Also plating more generally observed. Diphtheria due to decomposing matter in cellars.	D.—22. T.—4. S. F.—11.	Two slaughter-house nuisances abated.
Caledonia.....	The community has on the whole enjoyed very good health.	.....	.....	Assistance was given family in which diphtheria occurred.	D.—2	The carcass of a dead horse removed from highway.
Cambridge....	Members of Board act as inspectors in their respective localities.	.....	.....	Free from infectious diseases.	.....	.....
Camden.....	M. H. O. reports a general observance of provisions of Health Act on part of the people.	.....	.....	Every attention given to infectious diseases, such as isolation, etc.	.....	.....

TOWNSHIPS.—Continued.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses and pig-pens.
Cartwright	Certain nuisances complained of were abated.	.....	.....	Isolation and disinfection of premises prevented spread of scarlet fever.	S. F.—1.	.....	.....
Chaffey	Some houses found in a bad sanitary condition.	Well closed up on account of impurity of water.	.....	Diphtheria very prevalent. An isolation hospital needed in Muskoka. The disease carried from one house to another.	.....	.....	.....
Charlottetown.	All necessary sanitary arrangements carried out.	.....	.....	In no case did disease spread from house where it originated.	D.—A few cases.	.....	.....
Chinguacousy	But one complaint to Board during the year.	.....	.....	Comparatively free from infectious diseases, but those that did occur not reported.	.....	.....	.....
Clarke .....	.....	.....	.....	Every precaution taken to prevent spread of infectious diseases.	D.—1. T.—1.	.....	.....
Crowland	Sanitary condition of township fair.	.....	.....	Free from infectious diseases.	.....	Drainage greatly improved during past year.	.....
Darlington	Sanitary condition fair with exception of privies. M. H. O. wishes that something could be devised to do away with these noxious pits in country places.	.....	.....	Owing to isolation and other measures taken diphtheria was confined to first cases, with one exception.	D.—A number of cases. T.—A few cases.	.....	Privies in a filthy condition in many cases and unfit for use.

Dorham	The sanitary condition of township is good.	.....	.....	Diphtheria supposed to be due to impure drinking water.	D.—Few cases. T.—Few cases.	.....
Dorchester, North	One or two complaints of infringement of Health Act.	.....	.....	Only one case of infectious disease reported.	.....	.....
Downie .....	.....	Wells in connection with schools cleaned out.	Accumulations of whey from a cheese factory causing a nuisance.	Free from infectious diseases.	.....	A hog-pen nuisance in connection with a cheese factory reported.
Dumfries, North	Board drew the attention of trustees to the requirements <i>re</i> the heating and ventilation of schools. House to house inspection made in villages.	Trustees of schools asked to look to the purity of drinking water supplied.	Inspection of cheese factories was made and the premises of those supplying milk to town.	.....	T.—4. S. F.—A few cases.	Slaughter-houses have been inspected.
Dumfries, South .....	.....	The wells at the different schools were cleaned out.	.....	Typhoid caused by a defective sink in a pantry where milk was kept, and impure water.	T.—5. S. F.—A few cases.	.....
Dunbar	M. H. O. thinks the Board should give the matter of ventilation of schools consideration.	M. H. O. suggests that more attention be given to the drinking water at schools.	.....	Care exercised, such as isolation, etc., prevented diphtheria from spreading. Placarding not generally adopted. Diphtheria due to filthy surroundings.	D.—Several cases. T.—“ S. F.—“	.....
Dysart	A careful inspection of village was made.	Water supply plentiful and good.	.....	Free from infectious diseases.	.....	.....
Elderslie	Members of Board made inspection of municipality.	.....	.....	Two cases of supposed typhoid arising from unsanitary conditions.	.....	.....
Elma	Only one nuisance reported to Board, which was abated.	.....	.....	Secretary of B. H. thinks vaccination should be enforced.	D.—A few cases. T.—“ S. F.—“	Considerable drainage done, which has had a marked effect on health of community.

TOWNSHIPS.—Continued.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses and pig-pens.
Emily.....	Sanitary condition of township good.	.....	.....	Free from infections.	.....	.....	.....
Emiskillen.....	.....	.....	.....	Diphtheria supposed to have been spread by school children, the nature of the disease at first being unknown.	D.—Cases. S. F.—“	.....	.....
Erin	Some buildings found to be in an unsanitary condition, but put to rights by owners after notification.	Some well water found impure.	.....	Some physicians have not complied with provisions of S. F.—7. Health Act. Typhoid due to pollution of well and unsanitary condition of premises.	D.—29. T.—5. provisions of S. F.—7.	.....	.....
Esquesing.....	Members of Local Board met Committee of Provincial Board re anthrax at Acton. Inspection of all villages in township made.	.....	.....	Prompt measures taken to prevent the spread of infectious diseases.	D.—Several cases. T.—2.	.....	.....
Euphrasia.....	Sanitary condition of township satisfactory.	.....	.....	Isolation and disinfection adopted to prevent spread of diphtheria.	D.—3. T.—1.	.....	.....
Flamboro', East	No complaints of nuisances during the year.	.....	.....	Some cases of zymotic diseases, but no deaths.	.....	.....	.....
Gainsboro'.....	General health of people of township good.	.....	.....	Secretary thinks there should be in every municipality a portable furnace for disinfecting clothing, etc.	S. F.—A few cases	.....	.....

Garrfraxa West.....	The schools of the township were found in a good sanitary condition, with one exception.	.....	Free from infectious diseases.	.....	.....	Slaughter-houses have caused considerable trouble.
Glamorgan.....	Municipality in excellent sanitary condition.	.....	Free from infectious diseases.	.....	.....	.....
Glanford.....	Inspection of slaughter-houses by inspector.	.....	.....	.....	.....	.....
Glendg.....	Board has diligently looked after sanitary condition of township.	.....	Free from infectious diseases.	.....	.....	.....
Gloucester.....	Sanitary condition of township favorable.	.....	.....	.....	D.—13. S.F.—8.	Slaughter-houses are subject to inspection.
Goderich.....	No complaints made to Board during year.	Water supplied to school good.	Free from infectious diseases.	.....	.....	.....
Gosfield, North.....	.....	.....	.....	.....	D.—2.	One slaughter-house nuisance abated.
Greenock.....	The schools of the township inspected and found in a fair condition.	.....	Chase factory and pig-pens in connection therewith inspected; pig-pens not in a satisfactory condition and pigs ordered to be removed.	Inspector remarks that if infectious diseases were more promptly reported and looked after, the cases would be considerably diminished.	.....	.....
Grimsby, North.....	No complaints have been made to Board.	.....	.....	Free from infectious diseases.	.....	.....
Grimsby, South.....	Inspector made 65 inspections in Southville and reports great improvement in sanitary condition of village.	.....	.....	Secretary remarks that the utmost vigilance should be exercised by Local Boards to ward off cholera should it make its appearance in the county.	S.F.—A number of cases.	.....
Gwillimbury, East.....	.....	.....	.....	Isolation and disinfection used to prevent spread of diphtheria.	D.—46. T.—1.	Drains looked after. Slaughter-houses looked after by committee of Board.

TOWNSHIPS.—Continued.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses and pig-pens.
Hamilton	Stringent measures taken by members of Board have kept township in good sanitary condition.	.....	.....	Disinfection, isolation, placarding spread to prevent infectious diseases.	D.—1, S.F.—4.	Some collars found with water in them.	Some dead animals left unburied caused a nuisance.
Harwich	Complaints about sanitary condition of Fargo village made.	Artesian wells rapidly increasing in use.	.....	Isolation adopted to prevent spread of these diseases.	D.—A few cases, " " S.F.—	.....	Slaughter-houses have given but little trouble. The feeding of hogs on offal should be rigidly prohibited.
Hawkesbury, East.....	In a good sanitary condition.	.....	.....	Free from infectious diseases.	.....	.....	.....
Hawkesbury, West.....	M. H. O. recommends that vaccination be more generally carried out.	.....	.....	Isolation and placarding in infectious diseases.	D.—6, T.—2.	.....	.....
Hillier	A number of nuisances abated.	.....	.....	Isolation and disinfection used in infectious diseases.	S.F.—8.	.....	A slaughter-house complained of.
Houghton	Sanitary condition of township good.	Wells have been carefully looked after.	.....	Free from infectious diseases.	.....	.....	.....
Humberstone.	Inspection of township by inspector.	.....	.....	Isolation and disinfection in infectious diseases.	D.—3, S.F.—A few cases.	Considerable drainage of low lands.	.....
Innisfil	M. H. O. draws attention to inadequate sanitary arrangements of school and their outbuildings.	.....	.....	Diphtheria due to causes outside of municipality.	D.—A number of cases.	.....	.....

Keppel.....	The Board urged, in view of the advent of cholera, to keep township in good sanitary condition.	.....	.....	Free from infectious diseases.	T.—2.
Kincardine...	Township in a fairly good sanitary condition.	.....	.....	Isolation, placarding, etc., were the precautions taken to prevent spread of typhoid.	T.—Number of cases.
Kinloss. ....	.....	.....	.....	Physicians do not report infectious diseases as they should.	D.—1. T.—1.
Lindsay	Sanitary condition of township satisfactory.	.....	.....	Free from infectious diseases.	.....
Lobo	Very few complaints were made during the year; when properly made were attended to.	.....	.....	.....	T.—6. S.F.—A few cases.
Luther, West.	Health of the people good.	.....	.....	Free from infectious diseases.	T.—1.
Logan.....	M. H. O. points out that every Local Board should be thoroughly organized and have an adequate sum of money placed at its disposal to deal promptly and efficiently with epidemics should it appear.	M. H. O. recommends looking after the purity of drinking water.	.....	.....	T.—Several cases. S.F.—A few cases.
London	The drawing of night-soil into township caused a nuisance.	.....	.....	.....	D.—A few cases. T.—“
Maidstone....	Some matters arose to which the Board gave special attention.	.....	.....	.....	Drainage of municipality in an efficient state.

TOWNSHIPS.—Continued.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses and pig-pens.
Mariposa.....	Inspector made 149 house-to-house inspections, and directed the cleaning of yards, privies and wells.	Inspector gave directions to school trustees to have all wells at schools cleaned out.	.....	Local Board views with satisfaction the precautions taken by Provincial Board to stay progress of any epidemics.	D.—6. T.—2.		
Matchedash..	The schools have been open the whole year.	.....	.....	Free from infectious diseases.			
Markham...	Health of township not in a good condition.	.....	.....	M. H. O does not state what precautions were taken to prevent spread of diseases of this nature.	D.—Many cases. S.F.—Cases.		
McKillop....	People found willing to do all in their power to carry out provisions of Health Act.	M. H. O. suggests that wells be carefully looked after.	.....	Comparatively free from infectious diseases. M. H. O. urges all householders to prepare against cholera, should it make its appearance.			
Metcalfe.....	Municipality in fair sanitary condition.	.....	.....	.....	S.F.—A few cases.		
Middleton....	The odors from a canning factory complained of.	.....	.....	Precautions were taken to prevent spread of these diseases.	D.—5. S.F.—A number of cases.		
Minto.....	Some complaints were made of defective sanitary arrangements, which were remedied.	M. H. O. urges that each school section be notified to have wells at school thoroughly cleaned.	.....	Owing to precautions taken by attending physicians these diseases were confined to first cases.	D.—2. S.F.—2.		

Monaghan, North.....	Inspector instructed to prosecute any infringement of Health Act.	.....	.....	.....	.....	Proposed system of sewerage of Peterboro' disapproved of, looked upon as dangerous to public health.	Inspection of slaughter-houses made.
Mornington ..	.....	.....	.....	.....	.....	.....	.....
Mulmur	A house in a filthy condition, the cause of much illness, was destroyed.	.....	.....	.....	.....	.....	The M. H. O. remarks that the habit of leaving dead animals unburied exists to some extent.
Nassagaweya.	General sanitary condition of township fair.	.....	.....	.....	.....	.....	.....
Nichol	Board put notice in local newspaper ordering all garbage to be properly disposed of.	.....	.....	.....	.....	.....	.....
Orford	Board active in sanitary matters.	.....	.....	.....	.....	.....	All stagnant water ordered to be drained away.
Orillia	M. H. O. says that the people are learning to see the necessity of sanitary precautions.	.....	.....	.....	.....	.....	.....

TOWNSHIPS.—Continued.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses and pig-pens.
Oro .....	.....	.....	.....	Isolation in infectious diseases.	D.—Cases. T.—“ S.F.—“	.....	.....
East Oxford .....	.....	Well water found to contain organic matter.	.....	Diphtheria attributed to filthy condition of cellar and cistern.	D.—1.	.....	.....
Oxford, North	M. H. O. suggests that active steps be taken in the spring to secure the utmost cleanliness because of threatened invasion of cholera.	.....	.....	M. H. O. draws attention to the management of physicians as in other infectious diseases. Cases should be under control of M. H. O.	S.F.—6.	.....	Some privy vaults found in a filthy condition and ordered to be cleaned.
Percy	An inspection of the villages in the township made.	.....	When in connection with cheese factory allowed to accumulate and become a nuisance.	.....	.....	.....	Privies of some schools not cleaned out for years.
Pilkington	Board is of the opinion that the School Inspector should be more energetic in looking after condition of schools and their surroundings.	The water at two schools found to be bad.	.....	.....	.....	.....	.....
Pittsburgh	Sanitary condition of township on the whole good.	.....	.....	The typhoid due to impure water from wells.	T.—2.	Draining of property adjacent to typhoid cases ordered.	.....
Pauline	A regular inspection of school houses made twice.	.....	.....	Free from infectious diseases.	.....	.....	.....

Raleigh .....	.....	.....	.....	Complaints were made that children were at school from homes where scarlet fever existed.	T.—Few cases, S.F.—	.....	.....	.....	Several dead animals exposed were buried.
Richmond	The depositing of night-soil from other municipalities stopped.	.....	.....	.....	T.—Several cases.	.....	.....	.....	Slaughter-house nuisances abated. M. H. O. suggests that the feeding of hogs in close proximity to slaughter-houses be forbidden.
Saugeen .....	.....	Water on examination at one school found unfit for use.	.....	Isolation and disinfection in these diseases.	D.—A few cases, S.F.—1.	.....	.....	.....	.....
Scott.	All nuisances found were abated.	.....	.....	Every means taken to prevent spread of diphtheria.	D.—5.	.....	.....	.....	.....
Seneca ..	M. H. O. reports that vaccination is not as general as it should be.	Some privy pits too close to wells.	.....	Free from infectious diseases.	.....	.....	.....	.....	Privy-pits in several places need cleaning out and to be disinfected.
Somerville	Sanitary condition of township at present satisfactory.	.....	.....	Isolation and disinfection adopted to prevent spread of diphtheria, which was found difficult to stamp out.	D.—A number of cases.	.....	.....	.....	.....
South Easthope	Trustees of all schools notified to have privies cleaned.	The wells at all schools ordered to be cleaned, and any suspicious water analysed.	.....	.....	T.—Some cases, S.F.—Some cases.	.....	.....	.....	A slaughter-house and tallow-rendering nuisance abated.
Stamford	Water closets of the different schools have been cleaned. Eight nuisances abated.	Water supply from wells found generally of good quality.	.....	Placarding and disinfection adopted in these diseases.	D.—1. S.F.—1.	.....	.....	.....	Slaughter-houses, etc., looked after by inspector and refuse disposed of properly.
St. Vincent .....	.....	All the wells at schools were ordered to be cleaned.	.....	The clothes of a diphtheria patient were destroyed to prevent spread of disease.	.....	.....	The drainage of low-lying places was ordered.	.....	.....

TOWNSHIPS.—Concluded.

Name of place.	General inspection.	Water supply.	Cheese factories.	Infectious diseases.	Diphtheria, typhoid, scarlet fever.	Drainage.	Slaughter-houses and pig-pens.
Sullivan.....	Inspection of all school houses was made.	.....	.....	Isolation in infectious diseases.	D.—5.		
Sunnidale....	M. H. O. advises that privy pits be discontinued and dry earth closets substituted.	Some of the wells are not kept clean in municipality.	.....	Free from infectious diseases.	M. H. O. finds school houses imperfectly heated and not enough air space in some for each pupil and desks badly constructed.		
Sydenham.....	.....	.....	.....	Isolation and disinfection in these diseases.	D.—13. T.—1.		
Thorold.....	M. H. O. recommends a thorough cleaning up in the spring, in view of a possible visitation of cholera.	.....	.....	Precautions taken to prevent spread of infectious diseases.	D.—A few cases. T.—“ S. F.—“		
Townsend.....	.....	.....	.....	School closed to prevent spread of scarlet fever.	S. F.—A few cases.		
Turnberry....	M. H. O. recommends that walls of cellars be yearly white-washed with fresh lime. Mortality rate low.	M. H. O. advises that all wells be banked up to prevent entrance of surface water, and that privies be 100 feet from them.	.....	.....	.....	M. H. O. advises that all kitchen slops and waste material be disposed of far away from houses.	
Uxbridge.....	Some nuisances abated. General health of community good.	.....	.....	Diphtheria cases promptly looked after by placarding and disinfection.	D.—A few cases.		
Vespra.....	Nuisances caused by privies in school grounds abated.	.....	.....	Free from infectious diseases.	.....	

Wainfleet	M. H. O. suggests that owners of cheese factories be compelled to keep surroundings of same clean.	.....	Cesspools of whey in connection with a cheese factory causing a nuisance.	Isolation in infectious diseases.	D.—Cases. T.—3. S.F.—Cases.	.....	.....
Wawanosh, East	General health of community good.	.....	.....	Free from infectious diseases.	.....	.....	.....
Wellesley	School premises and wells have been inspected, and an improvement over last year was observed.	.....	Cheese factories and pig-pens have not been complained of.	A noticeable feature in the diphtheria cases was the number of deaths from heart-failure. Want of proper isolation and disposal of excreta did much to spread the disease.	D.—6.	.....	One slaughter-house nuisance was abated.
Whitechurch .....	.....	.....	.....	Precautions taken to prevent spread of these diseases.	D.—Some cases. T.— S.F.—	.....	.....
Woolwich	A number of nuisances in the form of filthy yards remedied.	.....	.....	.....	T.—A number of cases.	.....	.....
York	Free vaccination carried out in public schools in vicinity of East Toronto owing to small-pox in Toronto.	.....	.....	Diphtheria in almost every instance was confined to house in which it originated.	D.—A number of cases.	.....	The dumping of night-soil, which had become a nuisance in the township prohibited.
Yonge, Front.	One complaint to Board which was settled without difficulty.	.....	.....	Free from infectious diseases.	.....	.....	.....
Zone	Schools visited twice and thoroughly inspected.	Water supply of school good in general.	.....	.....	T.—4 or 4.	.....	.....

N.B.—Reports from Hagersville, Smith's Falls villages, and from McLean, Beverly, Albion and Rainham make statements that they have had nothing of importance to report.

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